

**Information resources for restoration planning:
basin-wide wetland/riparian maps, wetland/riparian
functional assessment, and comprehensive plant
community descriptions.**

**Proposal submitted by:
The Montana Natural Heritage Program
March 3, 2006**

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1. APPLICANT INFORMATION AND PROJECT SUMMARY FORM

- 1. Name of Applicant:** Montana Natural Heritage Program of the Nature Conservancy
- 2. Project Title:** Information resources for restoration planning: basin-wide wetland/riparian maps, wetland/riparian functional assessment, and comprehensive plant community descriptions.
- 3. Type of Entity:** Non-profit organization (See Appendix A for supporting legal documents)
- 4. Description of Project Location :** Upper Clark Fork River Basin (see Map, page 38)
- 5. Injured Natural Resource(s) and/or Impaired Services to be Restored, Rehabilitated, Replaced or Equivalent Acquired through Project:**
Aquatic and terrestrial resources in Silver Bow Creek, the Clark Fork River, and the Uplands of the Upper Clark Fork River Basin, including wetland- and riparian-dependent wildlife, fish, and biota; surface and groundwater resources dependent on wetland filtering functions; and recreational services (birdwatching, waterfowl and wildlife hunting, fishing, hiking, nature study, photography, etc) associated with wetlands and riparian areas

6. Authorized Representative: Susan Crispin, Director, Montana Natural
Heritage Program
(Name) (Title)

Mailing Address: 1515 E. 6th Avenue
(Street/PO Box)
Helena, MT 59620-1800 406-444-3019
(City/State/Zip) (Telephone)

Contact Person*: James Williams, State Director, The Nature
Conservancy
(Name) (Title)

Mailing Address*: 32 South Ewing Street
(Street/PO Box)
Helena, MT 59601
(City/State/Zip)

Phone: 406-443-0303

E-mail Address: jwilliams@tnc.org

*** The agent for the service of process in Montana is:**

National Registered Agents, Inc
26 W Sixth Avenue
P.O. Box 1691
Helena, MT 59624-1691

7. Proposed Funding Sources

On the table below, enter the source and amount of all funding that may be used for this project. Indicate all potential sources of funds that you intend to apply for this project, even if you have not yet applied for the funds or have not yet received a commitment from the source. Indicate whether matching funds are cash or in-kind.

Funding Source		Amount in (\$) Dollars					Matching Fund Percentage (Funding Source Total/Project Total)
		Committed Funds			Uncommitted Funds	Total	
		Grants	Non-Grant Funds				
			Cash	In-kind			
A.	UCFRB Restoration Fund	\$ 394,515.30				\$ 394,515.30	73.26%
B.	Montana State Library			\$ 53,147.26		\$ 53,147.26	9.87%
C.	MTNHP		\$ 73,248.00	\$ 17,612.00		\$ 90,860.00	16.87%
D.							
E.							
F.							
G.							
H.							
I.							
Non-NRDP Totals		\$ 394,515.30	\$ 73,248.00	\$ 70,759.26		\$ 144,007.26	26.74%

8. Estimated Total Project Cost \$538,522.56
(Automatically Calculated from spreadsheet above)

9. Private (non-Governmental) Grant Applicant Financial Information

- Are there any lawsuits, judgments, or obligations pending for or against you? No
- Have you ever declared bankruptcy? No
- Are any of your tax returns delinquent or under dispute? No
- Any unpaid deficiencies? No
- Are you a party to a lawsuit? No
- Do you have any other contingent liabilities? No
- Do your current and deferred liabilities exceed the value of your assets? No

10. Certification for Individuals or Public Entities

Individuals or private entities requesting grant funds must sign the following certification.

Certification for Individuals or Private Entities

I (We) the undersigned, have provided this financial information as part of my (our) application for a grant from the UCFRB Restoration Fund. I (We) certify that the statement is complete and accurate to the best of my (our) knowledge and I (we) authorize the State of Montana to investigate my credit worthiness and any of the matters described above.

Individual(s)

_____ Name	_____ Social Security No.	_____ Signature	_____ Date
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_____ Name	_____ Social Security No.	_____ Signature	_____ Date
---------------	------------------------------	--------------------	---------------

Social Security Numbers will be kept confidential.

Private Entities

<u>Susan Crispin</u> Name of Authorizing Agent	<u>53-02426552</u> Federal Tax ID No.	_____ Signature	_____ Date
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11. Authorizing Statement

An authorized agent/agents representing the applicant must by his/her signature indicate that the application for funds and expenditure of matching funds, as represented, is officially authorized.

Grant Authorization

I hereby declare that the information included in and all attachments to this application are true, complete, and accurate to the best of my knowledge, and that the proposed project complies with all applicable state, local, and federal laws and regulations.

I further declare that, for the Montana Natural Heritage Program (Project Sponsor), I am legally authorized to enter into a binding contract with the State of Montana to obtain funding if this application is approved. I understand that the Governor must authorize funding for this project.

Montana Natural Heritage Program
Project Sponsor

Date

Authorized Representative (signature)

Susan Crispin, Director
Title

2. PROPOSAL ABSTRACT

Applicant Name: Montana Natural Heritage Program of the Nature Conservancy

Project Title: Information resources for restoration planning: basin-wide wetland/riparian maps, wetland/riparian functional assessment, and comprehensive plant community descriptions.

The Montana Natural Heritage Program (MTNHP) seeks \$394,515 to fund a three-year Monitoring and Research Program to 1) map all wetlands and riparian areas in the Upper Clark Fork River Basin (UCFRB) to National Wetland Inventory standards; 2) perform a landscape-level evaluation of actual and potential wetland and riparian function; and 3) develop a community field guide describing all plant communities in the Basin. Although the United States Fish and Wildlife Service mapped the watershed in the early 1980s, only a handful of these maps were digitized. The riparian areas have never been comprehensively mapped. Without digital maps, it is impossible to use current Geographic Information System technology to conduct watershed-wide assessments of the extent, distribution, classification and condition of wetlands and riparian areas in the basin. This in turn hinders effective restoration, rehabilitation and acquisition efforts, because there is no way to evaluate which wetland functions are most impaired, at risk, or intact. The Montana Natural Heritage Program will use 2005 National Agriculture Imagery (NAIP) 1-meter Color Infrared imagery to classify and delineate wetlands and riparian areas and produce digital maps meeting National Wetland Inventory standards. Each digital map will cover a U.S. Geological Survey 7.5 minute quad, and digital maps will be made available to the public through the website of our parent agency, the Montana State Library's Natural Resource Information Service (NRIS). The mapping will form the foundation for a basin-wide, landscape level assessment of wetland function. The assessment will be conducted with a Geographic Information System (GIS), based on digital maps, remotely-sensed data, and the results of previous field studies as appropriate. It will examine the spatial distribution of the various wetland and riparian types in relation to elevation, geomorphology, hydrology, land use and land cover. The outcome will be a characterization of overall wetland and riparian functioning, and an assessment of the factors affecting functioning in a given landscape unit (e.g. a watershed or sub watershed). Such a characterization and assessment will allow planners and managers to evaluate such issues as habitat fragmentation, areas of high concentration of impacts (mining and non-mining), and the occurrence and distribution of desirable wetland/riparian types. The third component of this project involves the creation of a comprehensive field guide to the hierarchy of vegetation communities (both upland and wetland) within the UCFRB. Restoration planners lack a complete and accessible resource to support the use of native plant communities in their restoration efforts. We will use literature searches and field surveys to create a user-friendly guide available in hardcopy and electronic formats, and will compile a database of all existing vegetation information.

3. TECHNICAL NARRATIVE

Applicant Name: Montana Natural Heritage Program of the Nature Conservancy

Project Title: Information resources for restoration planning: Basin-wide wetland/riparian maps, wetland/riparian functional assessment, and comprehensive plant community descriptions.

A. Project Need

Wetlands and riparian areas are complex, dynamic systems performing a range of hydrologic, biogeochemical, and habitat values and functions. Hydrologically, they act as both recharge and discharge areas, capturing and storing water during wet periods and releasing it during dry periods (Mitsch and Gosselink 2000). This storage and discharge cycle in turn reduces downstream flood peaks, maintains and moderates stream flows, and secures groundwater resources to support plant growth. Biochemically, wetlands and riparian areas transform and cycle nutrients, contributing to increased tree and plant growth, and food for downstream aquatic organisms. By trapping and removing dissolved substances and sediments from surface water, they also promote clean drinking water and oxygen-rich streams for fish production (Winter 2000). From a habitat perspective, wetland and riparian areas provide food, breeding sites, and cover for wildlife, fish, amphibians and birds, contributing to a diverse ecosystem while supporting such recreational activities as hunting, fishing, birdwatching, hiking, and nature study (Hannson et al. 2005). A recent study by a team of international economists (Costanza et al. 1997) valued the total of these ecosystem services at \$19,580 per hectare (1 hectare= 2.47 acres) per year for freshwater wetlands and riverine floodplains.

However, not all wetlands perform the same functions. A number of factors (e.g. position in the landscape, water source, size, depth, etc) determine the function of individual wetlands (Hauer 2002). In addition, the ability of wetlands to perform those functions is affected by their distribution and connectivity within the watershed, and by upland condition. Consequently, wetland functional assessments are often carried out on a watershed or basin scale, so that managers, planners, and restoration personnel can evaluate whether wetland and riparian areas are functioning as a whole across the watershed, or whether it is necessary to acquire, create, restore, or preserve specific categories or types of wetlands to protect ecosystem values (Tiner 2000).

Three factors inhibit effective wetland functional assessment and restoration planning in the UCFRB. First, although the U.S. Fish and Wildlife Service mapped the state from aerial photographs during the National Wetland Inventory (NWI) in the 1980s, only a small percentage of those maps were digitized or turned into hard copies for distribution. This is true of the Upper Clark Fork River Basin. NWI maps cover only the Southeast Missoula USGS 7.5 minute quadrangle map. The other 91 USGS quadrangles have no NWI digital maps. Moreover, there has been no systematic mapping of riparian areas. Second, without these maps, assessment of the extent, function, and type of wetlands and riparian areas within the UCFRB can only be achieved by on-the-ground evaluation. This

is a time-consuming and expensive proposition, with access issues compounding the difficulty of the task. No basin-wide analysis of the distribution and function of wetland and riparian areas has been performed, leaving planners and managers with inadequate background for decision-making. Third, there is a lack of accessible information about what native plant communities do or should exist within wetland, riparian, and upland areas within the UCFRB, how these are best used in restoration, and how restored (or natural) communities should be managed. There is a national standard (FGDC 1997) for describing vegetation associations, the National Vegetation Classification System (NVCS), and the Montana Natural Heritage Program (MTNHP) is Montana's information manager it. The NVCS is a hierarchical system, applicable at any scale, and it is the legend for current statewide USGS Gap Analysis Program (GAP) maps, but unfortunately, due to budget constraints, we do not have detailed information on many NVCS vegetation communities in the Community Field Guide section of our website (<http://www.mtnhp.org/Community/guide.asp>). More specifically, most UCFRB communities are not included, leaving resource managers without aids to plant community identification, planning, and management. Even at the most fundamental level of on-the-ground description, there are no comprehensive tools to help users identify community types. Finally, information on higher NVCS levels, like the ecological system level used in GAP mapping, is also not available on our website. Managers and planners therefore have no systematic accounts of community vegetation, environmental characteristics, management response, and conservation rank for vegetation in the UCFRB, nor any accessible database of plot data and relevant literature references to document the classification types. This means it is virtually impossible to establish vegetation baseline conditions across the entire range of habitats in the UCFRB, or to accurately describe desired future conditions.

B. Project Goals and Objectives

The goal of this project is to facilitate comprehensive, basin-wide planning of restoration, replacement and acquisition of wetland and riparian resources by accomplishing the following objectives:

1. Providing up-to-date, NWI-standard digital maps for the entire UCFRB, and making them available for free public download;
2. Characterizing actual and potential wetland/riparian function across the whole UCFRB, and publicly disseminating the results;
3. Developing a user-friendly guide to vegetation communities within the UCFRB, available in hardcopy and electronic formats, and compiling a database of all existing vegetation information.

B1. Current condition

1. **Mapping.** National Wetland Inventory maps for the Southeast Missoula 7.5 minute USGS quadrangle are available through the U.S. Fish and Wildlife Service (<http://wetlandsfws.er.usgs.gov/>) or through the Montana Natural Resource Information Service (<http://nris.state.mt.us/gi.asp>). No other NWI-compliant digital maps for the UCFRB are available. It is possible to request scanned copies of the aerial photographs

which were interpreted and classified by the U.S. Fish and Wildlife Service in the early 1980s and digitize these, but these lack riparian mapping and the digitization process is costly. Most importantly, human and natural changes to wetlands over the past twenty years mean that the 1980s maps, even when available, are not reliably accurate. Furthermore, advances in photogrammetry and photointerpretation techniques since the 1980s make it far preferable to base digital maps on current imagery. There will soon be National Agricultural Imagery Program (NAIP) 1-meter resolution Color Infrared (CIR) imagery from 2005 and 2006 covering the entire state. This imagery allows skilled photointerpreters to carry out heads-up digitizing of wetlands directly into a Geographic Information System. Currently, the Montana Natural Heritage Program (MTNHP) is contracting with the Montana Department of Environmental Quality and the Yellowstone River Cumulative Effects Study to transform NAIP imagery into digital maps of wetlands in the Bitterroot, Flathead, Gallatin and Lower Yellowstone watersheds. However, we know of no plans to create digital wetland maps for the UCFRB. Riparian areas are even less well mapped, because the National Wetlands Inventory excludes those portions of riparian corridors, which do not meet the hydrologic, vegetation, and soils criteria for wetland classification. As a result, areas such as woody draws along intermittent or ephemeral streams have never been mapped, even though they are vital habitat resources for many plant and animal species.

2. Characterization of wetland/riparian function. Individual riparian areas, including many along the Clark Fork River, have been assessed and characterized by the University of Montana's Riparian and Wetland Research Program (RWRP 1993, 1998). That program has also collaborated with Bitterroot Restoration to design an evaluation system for assessing restoration need/suitability in riparian areas (Bitterroot et al. 2004). Similarly, individual wetland restoration projects that are currently in the planning and execution stage may also include functional characterizations (See, for example, the projects described on the Montana Wetlands Legacy website at http://www.wetlandslegacy.org/project_database.htm and projects funded as part of the Natural Resources Damage Program grant process). However, these site-specific assessments differ in purpose and scale from the basin-wide wetland and riparian resource characterization we are proposing here. Basin-level assessments are typically conducted with a Geographic Information System, are based on digital maps and remotely-sensed data, and examine the spatial distribution of the various wetland and riparian types in relation to elevation, geomorphology, hydrology, land use and land cover (e.g. Tiner 2000, Johnson 2005, Vance 2005). The outcome of this kind of assessment is a characterization of overall wetland and riparian functioning, and an assessment of the factors affecting functioning in a given landscape unit (e.g. a watershed or sub watershed). Such a characterization and assessment allows planners and managers to evaluate such issues as habitat fragmentation, areas of high concentration of impacts (mining and non-mining), and the occurrence and distribution of desirable wetland/riparian types. Basin-wide assessments provide a basis for planning and coordinating site-specific evaluation and action. In the UCFRB, the unavailability of digital maps has precluded any opportunity to carry out basin-wide characterizations of wetland and riparian function.

3. Vegetation Classification and Associated Information. Native plant species are the cornerstone of successful restoration at the ecosystem level (Hoag 2001). Native plants are well adapted to local physical and biotic conditions, and are frequently the forage or shelter of choice for animal and bird species. However, restoration with native plants requires knowledge of vegetation communities, and their suitability for particular site conditions. The Montana Natural Heritage Program (MTNHP) is the state manager for the hierarchical National Vegetation Classification System (NVCS), which has been adopted as a standard for all federal agencies (FGDC 1997) and is the legend for the National GAP mapping currently underway. The hierarchical approach allows management and analysis at any appropriate spatial scale. The GAP mapping for Montana will be completed by the end of next year using the Ecological System Level of this hierarchy. However, no UCFRB-specific vegetation database/information system exists to support interpretation of GAP maps at the large scale of Ecological System types. At lower levels in the hierarchy, like the vegetation community level that we highlight in our web-based Community Field Guide, there is only a minimal amount of available information pertinent to restoration efforts in the UCFRB. For example, there are 273 distinct vegetation communities known to occur in the Beaverhead Mountains Ecological Section, and only 49 of these communities are presently in the Field Guide. Many of the 224 undescribed communities include types that occur in wetland and riparian areas. We have produced a dichotomous key to the plant associations for the Beaverhead Mountains Ecological Section, which can be found on our website (http://www.mtnhp.org/community/Reports/beaverhead_key.pdf), but much of the UCFRB is in the adjacent Bitterroot Valley Ecological Section, where there are no localized keys to plant identification. Therefore, restoration ecologists lack a comprehensive and accessible resource to support community restoration efforts and users of the larger scale GAP maps will have limited information to relate mapping types to vegetation, environment, habitat, and disturbance regimes. Additionally, we believe there are vegetation community types within the UCFRB that have not been recognized.

B2. Underlying causes of current condition.

The primary driver of the conditions described above has been a shortage of manpower and funding. A secondary, related driver has been the lack of inexpensive, basin-wide, high-resolution imagery for mapping:

- ❖ The U.S. Fish and Wildlife Service has emphasized more densely populated states in its wetland map digitization process, and it currently has no plan to digitize the remaining 1980s imagery for Montana. It supports (non-financially) current efforts to use high-resolution CIR imagery to produce current maps when those maps are created in accordance with NWI standards (USFWS 2004). Additionally, consistent high-resolution CIR imagery is only becoming available this year from aerial photography flown across most of the state in 2005.
- ❖ Without digital maps, it has not been possible to use GIS tools to conduct basin-wide wetland and riparian assessments, because wetlands and riparian areas were not delineated. Now that the CIR imagery is available, we are in the process of hiring a technician to establish a NWI/Riparian mapping center for Montana under a three year contract with the Montana Department of

Environmental Quality. This initial funding is directed at mapping specific priority areas, but all these areas are outside the UCFRB.

- ❖ The Montana Natural Heritage Program receives only a small portion of its annual budget from the state government through the Montana State Library. This limited funding can only support the management of current information and responding to data requests from agencies and the public. Although we have highly skilled botanists, ecologists, and information specialists on staff, we must seek use grant and contract money for all projects that are beyond the scope of core state funding, such as field collection of data to address information gaps and developing value-added products like identification keys and field guides.

B3. Desired future condition

1. Project goals and objectives. The goal of the proposed project is to facilitate comprehensive, basin-wide planning of restoration, replacement and acquisition of wetland and riparian resources by developing the underlying data and information and making it available in an easy-to-use format that is readily available to planners, managers, landowners, watershed groups, researchers, and the public at large. The project has three central objectives:

a) Create digital maps of wetland and riparian areas for all 92 USGS 7.5 minute quadrangle maps within the UCFRB based on 2005 CIR imagery. Map data will be incorporated into the USFWS master geodatabase so that it will be available nationally, and will be hosted as digital files through the Montana NRIS website and as Portable Document Format (.pdf) files on the Montana Natural Resource Information Service (NRIS) website.

b) Characterize actual and potential wetland/riparian function across the whole UCFRB, and disseminate the results by posting a report and associated maps on the MTNHP website, linked to the NRDP home page;

c) Develop a comprehensive guide to the hierarchy of vegetation communities (both upland and wetland) within the UCFRB, and make it available in hardcopy format and as updates to the MTNHP web-based ecology information system. This will also include a database of vegetation plot data and relevant reference material.

2. Changes in current condition/timeline. Upon completion of this project, all data, information and mapping gaps described under Section B.1 above will be filled. We estimate that mapping tasks will begin immediately upon funding (Spring 2007), and will be spread out over three years, with approximately 35 digital maps created each year. Mapping will be completed by December 2009, or approximately 6 months before the project end, with final map copies available by June 2010. Characterization and analysis of wetland and riparian function will begin in early winter during 2008 with preliminary compilation and analysis of other remotely sensed data (land cover and land use, hydrography, soils, geology, stewardship, transportation, elevation, and biological data). Final analysis and characterization will be done during the final 6 months of the project, and will be completed by May 2010. Work on the vegetation database, vegetation field

guide and expanded ecological classification information system will begin in May 2007 and extend through the field season in 2007 and 2008, with analysis and preliminary product development occurring throughout 2009. The final version of the vegetation field guide, including identification keys and associated information will be posted on our website as updates are available and will be complete by June 2010 at the latest.

3. Factors to be addressed. The two factors contributing to the current condition (a shortage of manpower and money) will be addressed if this project is funded. The MTNHP has the staff expertise required to complete this work within the designated time frame. Funding will support staff time to devote to the work described herein.

4. Primary and secondary benefits of this project. The primary benefit of this project will accrue to restoration and resource planners and managers working in the UCFRB, who will have digital maps and comprehensive data to support their decision-making. Secondary benefits will accrue to researchers interested in wetland and riparian resources/habitat, statewide wetland resource managers, wildlife planners and managers, recreationists (including hikers, anglers, hunters, birdwatchers, photographers and naturalists), and landowners, who will have maps and information resources to help them identify and effectively manage important resources. Other secondary benefits will be enjoyed by GIS analysts and users in local, state and federal agencies, who will have valuable new map layers to incorporate into their analyses.

C. Project Implementation Plan

1. Overall approach. The MTNHP wetland ecologist will act as the project manager, scheduling and overseeing execution of tasks so that interrelated tasks are completed in a complementary sequence. The project will have four distinct phases, each described in more detail under item C2 below: 1) a preparatory phase; 2) a data production phase; 3) a processing and analysis phase; and 4) a dissemination phase.

2. Project phases and components.

- a. Phase 1. Preparatory phase.** In this preliminary stage, staff will gather CIR imagery for digitizing, perform literature searches and outreach in support of the community field guide, and produce maps and secure access agreements for field personnel. Specific tasks will include:

Task 1. Identify and secure the appropriate imagery and digital data products to be used in map production. Staff will acquire 2005 NAIP CIR imagery for the Upper Clark Fork River Basin, covering all 92 7.5 minute quadrangles. We will also gather and preprocess digital NRCS soil surveys, NHD high-resolution stream reach layers, Digital Raster Graphic (DRM) layers, and Digital Elevation Maps (DEMs), which will be used as collateral data sources to increase mapping accuracy.

Task 2. Conduct literature searches and outreach to identify available vegetation information within the UCFRB. Staff will research published

and unpublished ecological literature and gather any vegetation plot data to produce a preliminary database and list of vegetation communities. Outreach to Forest Service personnel will consist of obtaining existing habitat maps, vegetation descriptions, and plot databases. Our goal is to assemble all existing vegetation information available for the area. Other information sources will include files and notes from researchers working in the basin, state and university libraries, and Montana Natural Heritage Program (MTNHP) files. We will also review records in the MTNHP databases for completeness, date of last observation and accuracy.

Task 3. Produce maps and secure access for field personnel. In preparation for field inventories of plant associations/communities and field map ground truthing (see Task 4 below), staff will use ecological, elevational, geological and soils data to identify discrete landscape units. MTNHP stewardship data, county cadastral records and other sources will be overlaid on these to identify property ownership and access, and to identify any desired target areas or access routes entirely in private ownership. Owners of any such areas will be contacted to obtain written permission to conduct field surveys. In the event that permission cannot be obtained, alternate access/target areas will be selected.

- b. Phase 2. Information production phase.** During the second phase of work, CIR imagery will be digitized and attributed, and fieldwork will be conducted to identify and characterize vegetation communities. Specific tasks will include:

Task 4. Identify field sites for map ground truthing. Using the preliminary maps produced in Task 3, we will overlay color aerial photos and identify an array of polygons representing the most widespread wetland types, e.g. a) palustrine forested wetlands; b) palustrine scrub-shrub wetlands; c) palustrine emergent temporarily or seasonally flooded wetlands; d) palustrine emergent semi-permanently or permanently flooded wetlands; e) upper perennial riverine wetlands; f) lower perennial riverine wetlands; g) softwood riparian forests; h) hardwood riparian forests; and i) upland areas functioning as wetland buffers. We anticipate that there will be approximately 100 of these polygons, distributed across the UCFRB to represent the range of hydrogeomorphic wetland classes (riverine, slope, depression) and distinct ecological regions (*sensu* Woods et al. 2002) found there. These polygons will be used to test and further develop a repeatable and accurate aerial photograph interpretation model. We will also contact sponsors of riparian restoration projects and coordinate with them to visit and map the restoration sites so that these can be included in the final maps. No field work will be conducted in the area immediately surrounding the Upper Clark Fork River, the Anaconda Uplands, or Butte Area One unless litigation is resolved and specific authorization has been given by the Natural Resource Damage Program

Task 5. Collect data at field sites for aerial photography interpretation.

Within each of the polygons identified above, we will perform the following data collection tasks at a representative plot:

- Record dominant vegetation and environmental data within a 400 m² sampling plot on the standard MTNHP Community Survey Form;
- Record hydrologic indicators;
- Collect a GPS point and directionally-referenced photograph(s) at each plot.

For each of the polygons, we will also complete a Rapid Wetland Assessment (DEQ 2004). Data will be collected between during the summer months of 2007.

Task 6. Map wetlands and riparian areas in the entire UCFRB. Under the guidance of the MTNHP wetland ecologist, the MTNHP digitizing technician will classify and delineate all wetlands and riparian areas in the UCFRB, following the protocols and procedures in *Conventions for the National Wetlands Inventory* (USFWS 1995). 2005 NAIP Color IR imagery will be the primary source for mapping. The digital data preprocessed during Task 1 (NRCS soil surveys, NHD high-resolution stream reach layers, Digital Raster Graphic (DRM) layers, and Digital Elevation Maps (DEMs) will be used as collateral data sources to increase mapping accuracy. Wetlands will be classified according to *Classification of Wetlands and Deepwater Habitats of the United States* (Cowardin et al. 1979) and mapped according to *Mapping Conventions Used to Identify Wetlands Within the Northern Rocky Mountains and Great Plains* (USFWS 1998) and *Technical Procedures for Mapping Wetland, Deepwater and Related Habitats* (USFWS 2004a). Riparian areas will be mapped and classified according to *A System for Mapping Riparian Areas in the Western United States* (USFWS 1997). Quality Assurance/Quality Control procedures will follow the guidelines in *National Standards and Quality Components for Wetlands, Deepwater and Related Habitat Mapping* (USFWS 2004b). Mapping of any areas immediately surrounding the Upper Clark Fork River, the Anaconda Uplands, or Butte Area One will not be done unless litigation is resolved or specific authorization has been given by the Natural Resource Damage Program.

Task 7. Verify mapping accuracy. Additional field reconnaissance trips will be conducted in June, July and August of 2008 to ensure that wetlands have been correctly classified, to review any questionable types, and to locate any perennial or intermittent streams that were not properly identified by remotely sensed imagery. The MTNHP wetland ecologist will attempt to visit a minimum of 10 wetlands within each identified and mapped wetland type for ground truthing of classification and size determination.

Task 8. Complete digital and hardcopy maps. Staff will follow the procedures and protocols described in the *National Standards and Quality*

Components for Wetlands, Deepwater and Related Habitat Mapping (USFWS 2004b) to produce digital wetland and riparian map data for each of the 92 USGS 7.5 minute quadrangles in the UCFRB. Maps will use Montana State Plane Coordinate System (NAD 1983) and Lambert Conformal Conic projections. Digital maps will include attribute tables following National Wetland Inventory parameters, and metadata complying with the *Federal Geographic Data Committee Content Standards for Digital Geospatial Metadata* (FGDC 1998). Data will be incorporated into the USFWS NWI/Riparian mapping master geodatabase so that it is available to everyone.

Task 9. Conduct field surveys for vegetation communities. Using the lists and maps produced in Task 2 and 3, staff botanists and ecologists will inventory landscape units within the UCFRB. Choice of types to be surveyed will be based on an initial analysis of data gaps within our plot database and any other plot databases we can obtain. The plots will be sampled using standard Montana Natural Heritage community survey methods with detailed vegetation and abiotic sampling. These methods include identifying all vascular plant species with cover values by classes in a circular plot size of 400 square meters (11.28 m radius, about 1/10 acre), recording ground cover by classes, and measuring slope, aspect and other environmental data. Plot area will be scaled back or changed in shape if the site is not abiotically homogeneous, but will never be less than 200 square meters in size. We will make preliminary determinations of plant associations for each site based on the International Classification of Ecological Communities (NatureServe 2002). This database, developed by The Nature Conservancy (TNC) and NatureServe, forms the basis for the standardized National Vegetation Classification. It incorporates and expands on published state and regional plant community classifications, such as Pfister et al. (1977), Mueggler and Stewart (1980), Hansen et al. (1995), and Cooper et al. (1995, 1999). The principle floristic references used for plant identification will be Hitchcock et al. (1955-1969) and Dorn (1984). Nomenclature will follow Kartesz (1999). No field work will be conducted in the area immediately surrounding the Upper Clark Fork River, the Anaconda Uplands, or Butte Area One unless litigation is resolved and specific authorization has been given by the Natural Resource Damage Program

- c. **Phase 3. Processing and analysis phase.** The third phase will use the digital wetland maps created under tasks 7 and 8 as the basis for a basin wide assessment and analysis of wetland and riparian areas. The field data collected under task 9 will be used, along with existing and outreach data, to identify and describe any new vegetation communities. We will create new community descriptions, develop a key to Bitterroot Valley Ecological Section vegetation communities, produce a field guide to UCFRB vegetation communities, and incorporate all new information into the MTNHP ecology information system and field guide.

Task 10. Conduct a basin-wide assessment of wetland and riparian areas. Johnson (2005) introduced an approach to wetland assessment (referred to as “Hydrogeomorphic Wetland Profiling”) based on remotely-sensed elevation,

geomorphic, hydrologic and land use/ land cover data. This approach builds on similar methods developed by Tiner (2000), which have been used and modified for similar assessments in Montana by MTNHP ecologists (Crowe and Kudray 2003, Vance 2005). By identifying and grouping separate process domains within a target area (e.g. a county, a watershed, etc), Johnson was able to characterize larger landscape units as “reference” or “impacted,” and used these as the basis for evaluating the distribution and condition of hydrogeomorphic function across the entire area. Using Johnson’s broad approach, we will identify the appropriate homogeneous landscape units (e.g. 5th or 6th-code HUCs, ecological subregions, elevation bands, land type associations, ecosites, etc) in the context of the UCFRB, and will identify landscape level indicators of impacts (e.g. mining impacts, land use/land cover, parcel size, fragmentation, etc). We will then apply a GIS-based methodology for hydrogeomorphic (HGM) wetland types and functions to the newly mapped wetlands as maps are completed. Accuracy will be assessed by field surveys in the first completed quadrangles during the summer and fall of 2008. From this, we can determine wetland types and functions that are most at risk from anthropogenic impacts, and identify any patterns of wetland loss or modification within impacted landscape units (vis-à-vis non-impacted units). The second step in this analysis will be a habitat-centered assessment of the basin-wide wetland landscape. Using the FRAGSTATS program developed by McGarigal et al. (2002), we will evaluate wetland distribution and abundance using a variety of landscape metrics, including (but not necessarily limited to) isolation and proximity, density, connectivity, patchiness and diversity. This two-part analysis will form the foundation for a report recommending specific areas, wetland classes and landscape types that should be prioritized for restoration, replacement, preservation, or acquisition. However, we will not include the area immediately surrounding the Upper Clark Fork River, the Anaconda Uplands, or Butte Area One unless litigation is resolved or specific authorization has been given by the Natural Resource Damage Program

Task 11. Analyze plant data to identify vegetation communities. We will evaluate the new plot data we have gathered with the existing vegetation databases, literature, and Natural Heritage information from our program and NatureServe. If this initial analysis indicates uncertainties in vegetation type classification we will analyze plot data using agglomerative cluster analysis, multi-response permutation procedure, and indirect ordination using the software PC-ORD (McCune and Mefford 1999). Relationships among species and between species and environmental factors will be drawn out by ordinating sample sites in species space and species environmental space using non-metric multidimensional scaling (NMS, Kruskal 1964, Mather 1976). We will omit species occurring in fewer than 5% of sites from the analysis to reduce beta diversity and improve the interpretability of results. We will then use a hierarchical, agglomerative cluster analysis to define vegetation groups based on floristic similarity. To determine the maximum number of interpretable clusters, we will perform an indicator species analysis (ISA). ISA identifies species that are strongly associated with individual

clusters. Each species receives an indicator value based on its abundance and frequency of occurrence within clusters. Monte Carlo tests are then used to evaluate the strength of these associations. ISA will be repeated for each level of clustering. We can then determine the most ecologically meaningful number of clusters with a technique advocated by McCune and Grace (2002) that chooses the number of clusters with the most robust indicator. Correspondence of the cluster analysis with the NMS ordination will be improved by using a quantitative version of the Sørensen distance measure and the flexible beta linkage method. Multi-response permutation procedure (MRPP, Biondini et al. 1988) will be used to test whether NVCS-based plant associations are significantly different in species composition and abundance. In addition to a P-value, MRPP describes group tightness with A, a statistic that compares the within-group heterogeneity to that expected by chance ($A = 1$ when items are identical within groups, $A = 0$ when heterogeneity within groups equals that expected by chance, and $A < 0$ when heterogeneity within groups is greater than that expected by chance) (McCune and Mefford 1999). To improve the correspondence between MRPP and NMS, MRPP will be based on a rank-transformed Sørensen distance matrix (McCune and Grace 2002).

Task 12. Compile descriptions of vegetation communities. The results of the analysis conducted under Task 11 will be supplemented with existing information to create descriptions of vegetation communities within the NVCS ecological classification hierarchy. New hierarchy levels will be created if deemed beneficial for management purposes. These descriptions will summarize known information about the association/community, including its geographic and elevational range, typical environment, associated vegetation, community dynamics, management, conservation status, wetland indicator status (if appropriate), and global and state conservation status. Descriptions will be added to the MTNHP Community Ecology Field Guide database website as they are completed.

- d. **Phase 4. Dissemination of information phase.** In the project's fourth phase, we will disseminate the maps, information, and analyses produced under the first three phases to the public. Specific tasks will include:

Task 13. Make digital wetland maps and data available for download.

After incorporating the NWI/riparian mapping data into the USFWS master geodatabase, the data will be available at the National NWI site and through our partner agency, the Montana State Library Natural Resource Information Service (NRIS). We will also make Portable Document Format (.pdf) files of wetland maps for each 5th code watershed within the UCFRB, and post these on our website and on the NRIS website for download.

Task 14. Create a dichotomous key for vegetation communities for the Bitterroot Valley Ecological Section and the UCFRB. These keys will be geared towards restoration planners, resource managers, landowners and naturalists. Users with some knowledge of plants and plant characteristics will be able to use this key to identify and select appropriate plant materials

for restoration, to conduct site-specific wetland characterization and assessment, and to recognize high-quality wetland and upland sites. This key will be made available for download from our website.

Task 15. Develop a Plant Community Field Guide for the UCFRB. We will compile existing and newly-developed plant community descriptions into a single, comprehensive field guide for the UCFRB. Descriptions will be accompanied by photographs and literature references whenever possible. The field guide will be made available for download from our website, and will complement the existing key to the Beaverhead Mountains Ecological Section and the New Bitterroot Valley key created pursuant to Task 14.

Task 16. Publish the report created under Task 11 to the MTNHP website. As soon as it is completed, the report produced under Task 11 will be made available for download as a .pdf file from our website. The report will include an executive summary, an introduction, a detailed description of methods used in data collection and analysis, results of the analysis, and recommendations for specific areas, wetland classes and landscape types that should be prioritized for restoration, replacement, preservation, or acquisition. It will be accompanied by maps, figures, illustrations, a list of references, photographs, and community descriptions.

3. Project staff and time estimates.

Ten MTNHP staff will be involved in this work. The eight staff whose work will be charged to the project, plus the time involved over a 3-year period, are:

- 1) the MTNHP wetland ecologist, who will act as overall project manager, carry out preliminary mapping and planning work, conduct field sampling relating to mapping tasks, perform the analysis of wetland function and distribution, write the final report, and ensure timely completion of other tasks (350 days);
- 2) the vegetation ecologist, who will be responsible for field data collection relating to plant communities and associations, data analysis, database updating, dichotomous key preparation, and writing plant descriptions (150 days);
- 3) the senior ecologist, who will assume a quality control role, ensure timely and accurate data analysis, and manage development of the Plant Community Field Guide (120 days);
- 4) the digitizing technician, who will carry out photointerpretation and digitizing work, prepare digital files, create and populate a geodatabase, produce maps, and create metadata (315 days);
- 5) and 6) two support biologists, who will accompany ecologists during field surveys as necessary to assist in data collection, and who will be responsible for formatting reports and publishing them on the web, as well as performing database updating work as necessary (30 days);
- 7) the web applications developer, who will act as a liaison with NRIS, design additions and changes to the web site, create and manage interactivity and search functions, and ensure functioning of the links to reports and data (32 days);

8) the biological data systems coordinator, who will manage data entry and database updates, including updates to the Community Field Guide, and who will ensure that database functions are working and that data is accessible by the public (56 days);

Two additional staff will support the project. However, their time is calculated as part of the match, and is not billed to the project..

9) the information systems and services manager, who will supervise data entry and data management staff, manage information resources (including web and GIS services), acquire, manage and maintain scientific equipment and computer hardware/software, and who will oversee implementation of quality control and quality assurance procedures related to GIS data production as necessary (110 days);

10) the program director, who will manage personnel and programs, ensure continued program support, and supervise administration of the grant (110 days).

4. Contracted services. MTNHP has all the staff expertise needed to complete the project at this time. In the event that unforeseen circumstances make it necessary to contract out specific services, we will comply with all state contracting and procurement procedures as required by the terms of the Grant.

5. Permits, regulatory approval, or property access agreements. To the extent possible, we will conduct field surveys and sampling on public land. In the event that access to private land is necessary, we will contact landowners and secure written permission.

6. Relation to other projects. This project is independent of other projects being undertaken by MTNHP staff.

7. Ensuring long-term effectiveness. The accuracy of wetland and riparian maps over time depends on a number of natural and anthropogenic factors, including land use/land cover change (including restoration and natural succession), and natural disasters such as fire, flood, and landslides. However, these maps retain their effectiveness over a long period insofar as they act as a baseline for change detection. We anticipate that the maps will be useful as primary data for at least fifteen years, and will be indefinitely useful as baseline data. The Community Field Guide will be useful indefinitely, and access will be maintained through the MTNHP website. The MTNHP is a statutory program of the Montana State Library, which ensures that access to hard copy and electronic versions of maps, data, reports and field guides will remain available into the future through the Library and the Natural Resource Information Service.

D. Project Time Schedule

Task number from Section C2	Start date	Completion date	Comments
1. Identify and secure imagery and digital data products	5/2007	7/31/2007	

2. Conduct literature and herbarium searches	5/2007	6/30/2007	
3. Prepare maps and secure access	5/2007	6/30/2007	
4. Identify field sites for ground truthing	5/2007	6/30/2007	
5. Collect field data for photointerpretation	6/15/2007	8/15/2007	Requires completion of Tasks 1 and 3, and partial completion of Task 4
6. Map all wetland and riparian areas	9/15/2007	12/31/2009	Requires completion of Tasks 1,3,4,and 5.
7. Verify mapping accuracy	6/15/2008	7/30/2008	
8. Complete digital and hard copy maps	1/02/2010	5/30/2010	Requires completion of Tasks 1,3,4,5,6, and 7.
9. Conduct plant field surveys	6/15/2007	8/15/2008	Requires substantial completion of Task 2
10. Conduct basin-wide assessment	02/01/2008	5/30/2010	Requires partial completion of Task 8 to begin, full completion to finish
11. Analyze plant survey data	09/01/2008	5/31/2009	Requires completion of Tasks 2 and 9.
12. Compile plant community descriptions	6/01/2009	12/31/2009	Requires completion of Tasks 2, 9, and 11.
13. Make digital maps and data available	5/30/2010	6/30/2010	Requires completion of Task 8.
14. Create dichotomous key	1/02/2010	3/01/2010	Requires completion of Tasks 2, 9, 11, and 12.
15. Develop plant community field guide	3/02/2010	6/30/2010	Requires completion of Tasks 2, 9, 11, 12 and 14.
16. Publish report to website	6/1/2010	6/30/2010	Requires completion of Tasks 8 and 10.

E. Methods and Technical Feasibility

1. Methodology. Methods and standards for data collection, image interpretation and mapping have been discussed in detail under Section C. That description is incorporated by reference herein. Citations and documentation referred to in Section C can be found in Section H, below.

2. Success of methodology. All methods described herein are tried and proven. Montana Natural Heritage Program methods for plant community data collection, analysis, and characterization have been used extensively in work for state and federal agencies (e.g. Cooper et al. 1995, 1999, 2001a, 2001b, 2003; Cooper and Jones 2004; Kudray and Cooper 2005; Vanderhorst et al. 1998). Color infrared photograph interpretation is the current standard for wetland mapping at the basin and subbasin scale (Lathrop et al. 2005) All photointerpretation and mapping methods used in this project will meet the technical standards established for wetland mapping by the US Fish and Wildlife Service, the agency responsible for National Wetland Inventory maps (USFWS 1995, 1999, 2004a, 2004b). Wetland classification follows the well established procedures of Cowardin et al. (1979). Methods for basin-wide wetland and riparian assessment, while still being refined, have been used successfully throughout the country and in Montana (Crowe and Kudray 2003; Johnson 2005; Tiner and Swords 2000, Tiner 2001,

2003; Vance 2005; Whigham et al. 2003), and are promoted by the Environmental Protection Agency (Fennessey et al. 2003). Digital data production will follow the national standards of the Federal Geographic Data Committee (FGDC 1998).

3. Certainties and uncertainties of methodology. Detection of wetlands in heavily forested areas is difficult with traditional methods, but Color IR has proven more successful (Whigham et al. 2003). The fine resolution of 2005 NAIP imagery (1 meter) will also allow mapping of smaller wetlands than was possible during the 1980s National Wetland Inventory (USFWS 2004a). We are not aware of any other uncertainties associated with the methods planned for this project.

4. Uncertainties requiring further resolution. There are no such uncertainties.

5. Data gaps. There are no data gaps that we are aware of, except those which this project is designed to fill.

6. Potential complications and effect on time schedule.

- a) Review and approval of the 2005 NAIP imagery by the U.S.G.S. for use in map production has not yet been completed. However, this approval process is expected to be complete by April of 2006, so we do not expect it to pose any problems.
- b) Staff turnover, especially in key positions (ecologists, digitizing technician) could delay data analysis and map production. Nevertheless, we are not aware of any potential staff departures during the duration of this project.
- c) There is a possibility that some representative wetland types necessary for calibration and ground truthing of keys will not be accessible because of landowners refusing to grant access. If this should occur, we will have to find comparable wetland types in nearby basins. This might cause short delays in mapping of those wetland types. However, since scarcity of representative types on accessible lands would occur only in the case of uncommon types, the overall impact on map completion would be minimal.

F. The Monitoring Plan

Because no on-the-ground site alterations or improvements are to be carried out under this project, monitoring activities are unnecessary. Instead, we will follow standard project management principles and quality assurance practices to ensure timely and accurate project completion, and will meet or exceed all quality control standards for mapping (USFWS 2004b)

G. Qualifications of The Project Team

- Linda Vance, the wetlands ecologist and project manager, holds a Ph.D in ecology from the University of California at Davis, and has worked extensively in riparian and wetland assessment and monitoring in California, Nevada, and Montana. Her recent and current projects include watershed-level wetland assessment and mapping for the BLM and the Montana DEQ; development of a GIS-based tool for assigning hydrogeomorphic modifiers to wetland maps; and

- evaluation of wetland change detection methodologies for the Montana DEQ and the Yellowstone River Cumulative Effects Study.. She has acted as a project manager for both short-term and multiyear projects in university, government, private sector, and non-profit settings.
- Stephen Cooper, MTNHP vegetation ecologist, earned his Ph.D in Botany from Washington State University, and has conducted numerous studies on forest habitat, alpine vegetation, grizzly bear vegetation and riparian communities throughout Montana and the Greater Yellowstone Ecosystem. His recent and current projects include inventories of plants and plant communities in the Snow-Talon burn in the Helena National Forest, investigating relationships between the National Vegetation Classification System and NRCS ecosite types in southwestern Montana, examining postfire sagebrush shrub-steppe succession for the BLM, and developing a crosswalk between NWI wetland types and vegetation communities for the Montana DEQ.
 - Greg Kudray, the senior ecologist, received a Ph.D in Forest Science from Michigan Technological University, and has been involved in regional conservation assessments and wetland and vegetation mapping in both Montana and Michigan, where he mapped over 200,000 acres of wetlands in the Hiawatha National Forest. His recent and current projects include creating vegetation maps of the Rocky Mountain Front for the Forest Service, mapping the Centennial valley for the Nature Conservancy, and designing and implementing a three-year NWI and riparian mapping project in the Bitterroot, Gallatin and Flathead watersheds for the Montana DEQ.
 - The digitizing technician position has been created and funded, and hiring is underway. The offer has not yet been extended, and so we cannot describe the technician's qualifications at this time. We expect this position to be filled by May of 2006.
 - Scott Blum, a support biologist, holds an M.S. in Ecology from Idaho State University. His past work has included performing GIS analyses of mountain lion habitat, and tracking grizzly bears and coyotes. His primary duties at MTNHP in recent months have involved data entry and review for a statewide harlequin duck database and tracking of goshawk nests.
 - Coburn Currier, a support biologist, has a B.S. in Biology from Michigan State University. His work with MTNHP has included aquatic invertebrate and fish community sampling as well grassland bird surveys. He is responsible for formatting and publication of all MTNHP reports, and for database data entry and data review.
 - Dave Ratz, the web applications developer, received a Diploma in Computer Programming from the Computer Learning Center in Alexandria, Virginia. For the past 19 years he has done programming, analysis, design, and network supervision for private corporations, universities, government, and non-profits. His programming languages include ASP, VB, JS, .NET, C#, SQL, and he is skilled in using Adobe PhotoShop. Current web design projects for MTNHP include interactive applications covering Montana bird distribution, Species of Concern, an Element Occurrence portal, and plant and animal Field Guides.

- Karen Walker, the biological data systems coordinator, earned an M.S. in Forestry from the University of Minnesota. She has done extensive work in database development and management for the Forest Service and the MTNHP, and is an accomplished GIS analyst with considerable experience in photointerpretation. Her current projects include overhauling all species observation data currently in the Forest Service, Montana Fish, Wildlife and Parks, and MTNHP databases, and migrating the records to a new system that will create easier data retrieval and display.
- Allan Cox, the Systems and Services Manager, holds an M.S. in Geography from the Virginia Polytechnic Institute. Before joining the MTNHP in 2001, he was Program Manager for the Montana Census and Economic Information Center (CEIC) at the Montana Department of Commerce, and was a GIS consultant in private practice. In 1987, he established the Montana Natural Resource Information System (NRIS), a program of the Montana State Library, working as its GIS Coordinator until 1992, and its Director from 1992 until 1998. He serves on the Governor's Homeland Security Task Force GIS Sub-committee, and participates in the Montana GIS Users Group.
- Susan Crispin, the MTNHP Program Director, earned an M.S. in Botany from Michigan State University. She is an accomplished botanist and plant taxonomist, and has led state and regional conservation initiatives in the United States and Canada. She has been managing conservation and biodiversity programs since 1980, and has been with the MTNHP since 1995.

H. Supporting Technical Documentation

1a. List of references cited in the text (All MTNHP documents are available on our website or from the Montana State Library; all other unpublished documents can be furnished upon request)

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1b. References for technical approach not cited in the text

Lyon, J.G. 2001. Wetland landscape characterization: GIS, remote sensing, and image analysis. Ann Arbor Press, Chelsea, MI. 135 pp.

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Maus, P.E. and M.L. Golden. 1996. Guidelines for the use of digital imagery for vegetation mapping. EM-7140-25. U.S. Department of Agriculture, Forest Service. Washington DC. 111 pp. plus maps.

Mowrer, H.T. and R.G. Congalton (eds.). 2000. Quantifying spatial uncertainty in natural resources: theory and applications for GIS and remote sensing. Ann Arbor Press, Chelsea, MI. 244 pp.

2. Unpublished materials relevant to technical feasibility. Any unpublished document cited in the text can be provided by MTNHP upon request.

3. Maps of project area. The project area encompasses the entire UCFRB. The map on the following page shows the USGS 7.5 minute quadrangles covering the project area.

4. Easements, rights of way, and access agreements. No easements or rights of way will be required for this project. When private land is to be crossed to access data collection sites on public land, or when data collection must be conducted on private lands, our standard practice is to send a letter to the landowner requesting permission to

enter. The letter details the area that we wish to access, the proposed dates of access, the data to be collected, the disposition of the data, and how to obtain copies of any reports based on the data. The letter is accompanied by a stamped, self-addressed postcard with text appropriate to the particular access request, as, for example, "I grant permission to _____ of the Montana Natural Heritage Program to access my property located at _____ between the dates of _____ and _____ for the purpose of _____." We customarily make a phone call to the landowner in addition to sending the letter. As noted above, we expect to keep field data collection of private land to a minimum.

4. ENVIRONMENTAL IMPACT CHECKLIST AND NARRATIVE

Environmental Impact Checklist

Impacts to Physical Environment	No Impact	Potentially Adverse	Potentially Beneficial	Permits or Approvals Required	Mitigation Required
1. Soil suitability, geological or topographic constraints	X				
2. Air quality	X				
3. Groundwater resources and quality	X		X		
4. Surface water quality, quantity and distribution systems	X		X		
5. Floodplains and floodplain management	X		X		
6. Wetlands protection	X		X		
7. Terrestrial and avian species and habitats	X		X		
8. Aquatic species and habitat	X		X		
9. Vegetation quantity, quality and species	X		X		
10. Unique, threatened or endangered species or habitats	X		X		
11. Unique natural features	X		X		
12. Historical and archeological sites	X				
13. Aesthetics, visual quality	X				
14. Energy resources, consumption, and conservation	X				

Comments: The project will not cause any direct impacts to the physical environment. No sites will be altered during field data collection, except for incidental bruising of groundcover during site inspection. Plant samples are only collection when identification is uncertain, and when there are enough individuals in a population that removing a sample will not have an impact. Motorized access to field data collection sites will be on established roads; sites away from roads will be accessed on foot. We do, however, believe that this project involves potentially beneficial secondary impacts, as listed above, that will result from increased knowledge and understanding of the distribution, functioning, and composition of wetlands and riparian areas.

Impacts to Human Environment	No Impact	Potentially Adverse	Potentially Beneficial	Permits or Approval Required	Mitigation Required
15. Human Health and Safety	X				
16. Agricultural production (grazing, forestry, cropland)	X				
17. Access to recreational activity, public lands, open space	X		X		
18. Nuisances (odor, dust, glare)	X				
19. Noise (e.g. separation between housing and construction areas)	X				
20. Hazardous substance handling, transportation and disposal	X				
21. Local and state tax base and tax revenue	X				
22. Employment, population, or housing	X		X		
23. Industrial and commercial production	X				
24. Land use compatibility; Consistency with local ordinances, or solutions, or plans	X				
25. Demands for governmental services (e.g. site security, fire protection, community water supply, wastewater or stormwater treatment, solid waste management)	X				
26. Transportation networks and traffic flow	X				
27. Social structures and mores	X				
28. Cultural uniqueness and diversity	X				

Comments: Field data collection and map production will have no direct impact on the human environment. Some secondary beneficial impacts are possible; the existing of wetland maps may allow better access to wetland-specific recreation, and there may be limited seasonal or temporary jobs created to support data collection and entry.

5. CRITERIA STATEMENTS

Applicant Name: Montana Natural Heritage Program of the Nature Conservancy

Project Title: Information resources for restoration planning: basin-wide wetland/riparian maps, wetland/riparian functional assessment, and comprehensive plant community descriptions

1. Technical Feasibility.

This criterion is addressed in detail in the Technical Narrative; that discussion is incorporated by reference herein.

2. Relationship of Expected Costs to Expected Benefits.

A. Direct and indirect costs

The direct and indirect costs of the project are laid out in the attached budget. Because none of the proposed activities interrupt services or cause environmental or human impacts, the costs listed in the budget represent an exhaustive enumeration of the costs of this project.

B. Direct and indirect benefits

1. This project will directly and indirectly benefit aquatic and terrestrial resources in Silver Bow Creek, the Clark Fork River, and the Uplands of the Upper Clark Fork Hydrologic Unit, including wetland- and riparian-dependent wildlife, fish, and biota and those surface and groundwater resources dependent on wetland filtering functions. By mapping wetland and riparian areas, conducting a basin-wide wetland and riparian functional assessment, and creating a community field guide to vegetation, this project will facilitate effective replacement, restoration, and acquisition planning for these resources. The amount of the benefit cannot be quantified, as it will be ongoing.

2. This project will directly benefit recreational services (birdwatching, waterfowl and wildlife hunting, fishing, hiking, nature study, photography, etc) associated with wetlands and riparian areas. The maps and field guide produced under this project will be available to the public. The amount of the benefit cannot be quantified, as we cannot predict how many people will download and use the maps.

3. This project will directly benefit GIS analysts and users in local, state and federal agencies (including universities), who will have additional map layers to incorporate into their analyses. Maps and community field guides will also provide direct benefits to researchers and scientists studying any of the aquatic, terrestrial, or hydrologic resources in the UCFRB. The amount of the benefit cannot be quantified, because we cannot predict the number of people who will use the GIS layers, maps, and field guide.

3. Cost-Effectiveness

A. Alternatives that will accomplish the same or similar goals.

1. Mapping. There are three alternatives to the approach suggested here:

- a) Most of Montana's wetlands were mapped during the National Wetlands Inventory during the 1980s. The maps covering the UCFRB were never digitized (except for the Southeast Missoula quadrangle), but still exist. These maps could be digitized and used for the same purposes as the maps we propose to create. However, these maps are twenty years old, and given both human and natural factors, wetlands may have shrunk, grown, disappeared, changed in type (e.g. from riverine to palustrine, or from emergent vegetation to forest) or have been created. There has been no mapping of riparian areas, however, and so there is no opportunity to digitize old maps.
- b) A second alternative to the approach described here would be to use an image analysis software program (e.g. VLS's Feature Analyst, Leica Geosystems' Imagine or Stereo Analyst) to identify wetlands and riparian areas from Color IR photography without using a heads-up digitizing process, which involves more labor and cost. However, automated image analysis is not as accurate as heads-up digitizing, and substantial labor is still required to assess the classification, ground truth it, and correct the output. Moreover, this approach does not satisfy national standards for wetland mapping.
- c) A final alternative for mapping would be the no action alternative. Color aerial photos are becoming more easily available, and could be used on an image-by-image basis by planners, managers or recreationists to identify wetland areas. This approach would not allow for basin-wide assessment of wetland functions, since the images could not be easily manipulated and analyzed without first digitizing them, and persons who are unskilled in photointerpretation would have difficulty determining what was and was not a wetland.

We have proposed a multi-year, comprehensive approach to mapping which involves mapping the entire basin. There are two reasons this is preferable to a phased funding approach: first, the multiyear approach allows us to commit staff time over the period necessary to complete the task. Without the certainty of ongoing funding, staff time would be subject to assignment to other tasks, which might preclude any subsequent year's mapping. The second reason for proposing a multiyear approach is that the parts of this proposal are interconnected: the basin-wide assessment cannot be started until some maps are completed, and cannot be finished until all are done. Without the certainty of multiyear funding, this portion of the project would have to be delayed until all the mapping was completed, since interruption or discontinuation of the mapping would preclude completion of the assessment.

2. Basin-wide assessment of wetland and riparian function. The only alternative to this portion of the project would be to restrict its scope to individual watersheds or subwatersheds. However, this would not provide planners or managers with a basinwide, comprehensive analysis of wetland and riparian function, distribution, and value. From the perspective of basin-wide restoration, replacement,

enhancement, or acquisition, having a comprehensive assessment makes the most sense. We have requested a multiyear commitment to this part of the project because it does not lend itself to being broken into discrete parts, and completion of the whole task set associated with it will take longer than a year.

- 3. Development of a community field guide.** There are no alternatives to the approach described herein except no action, which would leave planners, managers, and recreationists with incomplete knowledge of the fauna and vegetation communities in the UCFRB. We are requesting multiyear funding for this portion of the project because its individual parts do not stand alone, and completion of the whole will require at least two field seasons for data collection, and a third year for analysis and compilation.

B. Cost comparison

1. Mapping.

a) Our inquiries into the cost of digitizing existing wetland maps have established that it can be done to NWI standards for approximately \$400 per USGS 7.5 minute quadrangle by a contractor. Labor associated with acquiring imagery, managing the contract project, turning the digitized maps into hard copy maps, and making the maps available for dissemination would add approximately \$150 per quadrangle. The total cost for all 91 unmapped quads (i.e. all but Southeast Missoula) would therefore be approximately \$40,950. Digitizing current CIR imagery and producing map products to NWI standards costs approximately \$1700 per quadrangle, for a cost of \$156,400 for the 92 quads in the UCFRB. In both cases, there would be additional costs associated with creating and hosting a website for download of the maps; however, these would be the same under both alternatives

b) We have not had enough success with using feature extraction software to be able to calculate its costs. However, we believe that the labor involved in monitoring, assessing, and correcting the automated output would mean that cost savings would not exceed 15%. Therefore, the cost of producing maps from CIR imagery using feature extraction software would be approximately \$132,940, plus the license cost (\$4000-8000 per single user license) of the software chosen.

c) The no action alternative would result in no costs under this proposal. However, substantial labor costs would be incurred by any potential user of CIR imagery to interpret the imagery and/or to use it in a GIS. Because the number of potential users is not determinable, we cannot estimate these costs. Moreover, this alternative would not accomplish the same goals as the proposed project.

2. Assessment of wetland and riparian function. On a basin-wide scale, the approximate cost of this portion of the project is \$125,000. There are 23 5th-code Hydrologic Units (HUCs) in the larger basin, which could be analyzed and assessed separately. However, the cost of setting up the GIS and performing the analysis would not reflect the smaller size of the landscape unit. We estimate that the cost of such an assessment, per 5th code HUC, would be approximately \$8,000 if each quad were to be assessed. Therefore, the cost of carrying out this analysis on a smaller scale would vary according to the number of 5th code HUCs analyzed. If all the 5th code HUCS were assessed one at a time, the total cost would be approximately \$184,000.

- 3. Development of a Community Field Guide.** We do not know of any alternatives methods to achieve the same or similar goals that this project component addresses.

C. Choice of alternatives.

- 1. Mapping.** The alternative we propose, mapping the entire basin from current CIR imagery, is more expensive than the other alternatives listed, but accomplishes the goals of the project in the most complete way. First, current CIR imagery has a higher resolution than the imagery used by the NWI in the 1980s, allowing for more accurate depiction of wetlands and identification of wetland types. Secondly, the original NWI mapping effort was restricted to wetlands, and did not fully encompass riparian areas without characteristic wetland vegetation, soils, and hydrology. Therefore, creating digital maps from the 1980s maps would not provide a complete picture of wetland and riparian areas within the basin. Third, we do not know the degree to which human and natural impacts have altered wetlands over the past twenty years. Consequently, we cannot be certain that maps produced from 1980s imagery would depict current wetland conditions.
- 2. Assessment of wetland and riparian function.** Conducting a landscape level analysis of the basin as a whole is more cost-effective than carrying out the analysis on one 5th code HUC at a time. Moreover, it is more in keeping with the ecosystem or basin approach to resource planning, and meets the overall goals of the UCFRB restoration plan more fully.
- 3. Development of a Community Field Guide.** The only alternative that will provide planners, managers, and recreationists with access to complete knowledge of the vegetation communities in the UCFRB is the alternative we propose here.

4. Environmental Impacts.

This criterion is addressed under Part 4, above, in the Environmental Checklist and Narrative.

5. Human Health and Safety Impacts

This criterion is addressed under Part 4, above, in the Environmental Checklist and Narrative.

6. Results of Superfund Response Actions

A. Response actions. Restoration of riparian habitat and function is an integral part of ongoing and planned response actions. Since this project addresses both aquatic and terrestrial resources, these response actions may affect the same resources and services.

B. Coordination with response actions

1. Response actions initiated prior to 2005 will be captured by the CIR imagery used in this project and will therefore be represented in the maps. Response actions initiated after that date will be captured pursuant to Task 4 of the Project Implementation Plan. We will coordinate with sponsors of response actions to visit riparian restoration sites and map their extent so that they can be represented in the final maps.

2. All components of our project augment ongoing and proposed response actions by providing maps and analyses of all wetland and riparian functions and types within the UCFRB. These maps, the analysis of basin-wide wetland and riparian functioning, and the community field guide will all guide planners and managers in decision-making.

3. No alteration of ongoing or proposed response actions will be required as a result of this project.

7. Recovery Period and Potential For Natural Recovery

A. Recovery period. This proposal broadly addresses aquatic and terrestrial resources, including wetland- and riparian-dependent wildlife, fish, and biota; surface and groundwater resources dependent on wetland filtering functions; and recreational services associated with wetlands and riparian areas. Natural recovery of individual components of these resources and services (to baseline conditions) might occur within 50 to 300 years. Wetland and riparian resources are interconnected, and the loss of wetland and/or riparian functions in one part of a basin can affect recovery of other resources, even if those other resources are actively managed or restored. Without the information resources needed for effective planning at both basin-wide and site-specific scales, the time frame for natural recovery (assisted by current response actions) could be at the high end of the range, and it is possible that some resources might never fully recover.

B. Enhancing recovery period. When resources are limited, wetland and riparian restoration requires sufficient information and resources to allow prioritization (Hyman and Leibowitz 2000, Johnson 2005, Tiner 2005). Digital maps and a basin-wide functional assessment that compares landscape units can help managers and planners prioritize their efforts for optimal success, while knowledge and selection of appropriate plant communities can promote better establishment of vegetation at restoration sites. We cannot precisely quantify how much faster recovery will occur with the information resources this project will provide, but we believe that the kind of integrated restoration planning made possible by this project would bring recovery down to the low end of the 50 to 300 year range referred to above, with some landscape units and individual wetland/riparian areas showing functional recovery much sooner (10-50 years).

References for Criteria Statement 7:

Hyman, J.B. and S.G. Leibowitz. 2000. A General Framework for Prioritizing Land Units for Ecological Protection and Restoration. *Environmental Management* 25 (1): 23 – 35

Johnson, J.B. 2005. Hydrogeomorphic wetland profiling: An approach to landscape and cumulative impacts analysis. EPA/620/R-05/001. U.S. Environmental Protection Agency, Washington, DC.

Tiner, R.W. 2005. Assessing cumulative loss of wetland functions in the Nanticoke River watershed using enhanced National Wetlands Inventory data. *Wetlands* 25(2): 405-419.

8. Applicable Policies, Rules and Laws.

A. Permits or regulatory approvals. None are required for the activities to be conducted under this proposal.

B. Coordination with local entities. Because this project is basin-wide, we have discussed it with state government rather than local governments. Specifically, we have spoken with Lynda Saul, the Montana Department of Environmental Quality Wetland Program Manager to determine if any wetland and riparian wetland mapping activities are planned in this area (no), and have spoken with Tom Heinz, Wetlands Legacy Program manager for Montana Fish, Wildlife and Parks to determine if any basin-wide wetland and riparian functional assessments are being conducted (no). As an agency providing information resources to local, state, regional, and federal agencies, we have also queried our own databases to determine the extent of community descriptions we have, and have asked individual scientists within our organization if they have any updates for this area in the planning stage (no). We have also discussed this project with the Natural Resource Conservation Service Geospatial Analyst C. Lee Maynard, and the Montana Fish, Wildlife and Parks GIS coordinator, Lydia Bailey, to ensure that no overlapping mapping or assessment activities are planned.

C. Other applicable laws, rules, policies. The only relevant laws, rules and policies of which we are aware that affect this project are the national standards and protocols for wetland and riparian area mapping, and the production of digital data, discussed above under Task 6 and 8 of the Project Implementation Plan.

9. Resources of Special Interest to the Tribes and DOI

A. Resources of special interests to the tribes and DOI would include migratory birds and special status species (e.g. threatened and endangered under the Endangered Species Act). Specific special status species known in this area are the Canadian lynx and the Bald Eagle, both listed as “threatened.” Over the long term, wetland and riparian habitat restoration would benefit both these species by increasing food supply.

B. No specific measures are included in this proposal to account for these species.

10. Project Location

This project involves basin-wide mapping, assessment and vegetation community description, as shown on the map on page 38. However, the work described herein will

not extend to the area immediately surrounding the Upper Clark Fork River, the Anaconda Uplands, or Butte Area One unless litigation has been resolved or specific authorization has been given by the Natural Resource Damage Program

11. Actual Restoration of Injured Resources

A. This proposal broadly affects aquatic and terrestrial resources, including wetland- and riparian-dependent wildlife, fish, and biota; surface and groundwater resources dependent on wetland filtering functions; and recreational services associated with wetlands and riparian areas. By providing the information resources necessary to ensure effective planning of restoration, all aspects of the project will contribute to actual restoration of injured resources.

B. This project contributes to actual restoration, but does not include any on-the-ground restoration. Therefore we cannot describe how and to what extent all resources will be restored. However, we believe that the availability of maps and community field guides will replace lost recreational services by providing birdwatchers, hunters, naturalists, hikers, and anglers with information that allows them to locate new areas for recreational pursuits.

12. Relationship Between Service Loss and Service Restoration

A. By facilitating wetland and riparian replacement, restoration, enhancement and acquisition, the proposed project would augment ecological services, including flood and erosion control, maintenance of food chains, and wildlife habitat, as well as human services such as recreation.

B. The services augmented by this proposal, as described in Section A, would facilitate the restoration of aquatic resources lost when elevated metal levels and sediments reduced or eliminated fish and aquatic insects. By emphasizing functional assessment and providing maps that facilitate watershed and basin-scale planning, this project will lead to wetland and riparian restoration efforts that will trap sediments and metals, and provide habitat structure for aquatic insects and fish. These services will also benefit terrestrial resources by providing information that will promote appropriate revegetation of upland and floodplain sites damaged by mine tailings, enhancing hunting, birdwatching, hiking, wildlife observation, and general recreation. Maps and community field guides will further facilitate direct replacement of recreational opportunities connected to both aquatic and terrestrial resources by guiding users to new or different areas for hiking, camping, fishing or wildlife watching. Finally, by enhancing wetland and riparian restoration, the project will address groundwater resource injuries by improving wetland and riparian filtering functions.

Map of proposed project area



3

13. Public Support

A. This project has been discussed with Lynda Saul, of the Montana Department of Environmental Quality; Tom Heinz of the Montana Wetlands Legacy Project of Fish, Wildlife and Parks; C. Lee Maynard, the Geospatial Analyst for the Montana office of the Natural Resource Conservation Service; Gerry Daumiller, Director of the Natural Resource Information Service; and Lydia Bailey, the GIS Coordinator for Montana Fish, Wildlife and Parks. All have offered encouragement and are willing to provide technical support. Our broader efforts to map wetlands and riparian areas within Montana are being supported by the Montana DEQ through an EPA grant, and by the Upper Yellowstone River Cumulative Effects Task Force, and we have reported on these at Montana Wetland Council meetings. We have also discussed our mapping projects with several tribal wetland and watershed coordinators, and with the Montana EPA. Our collaborators on past and ongoing wetland mapping projects include university researchers, state and federal agency personnel, and private contractors.

As we indicated above, our website is a widely-used source of information for the public and for local, state, and federal resource managers. In the last three months of 2005, the website had over 200,000 hits and over 5,000 unique users visiting the site each month.

14. Matching Funds

A. **Matching fund percentages.** We have calculated 26.74% of the total project cost will be funded by sources other than Restoration funds:

1. The Montana State Library provides 9.87% of the total project cost in the form of office space, utilities, maintenance, and some data storage/networking capacity. Because the cost of the library's contribution is tied to personnel (i.e. more people=more office space), we use a factor of 15% of total project personnel costs to calculate the amount. This is committed funding.

2. The MTNHP's core state funding contributes 13.6% of the total cost, which pays the salaries of our Director and our Systems and Services Manager. We determined this amount by estimating the number of days each person would spend on activities directly related to this project, and calculating salary and benefits for that amount of days. Our funding is on a biennial cycle, so this funding is only committed through the end of FY'09. However, the program is statutorily mandated, so we expect funding to continue.

3. The MTNHP will also contribute 3.3 % of the total project cost by supplying maintenance, repair and upgrading of equipment, servers, computers, digitizing equipment, software and software licenses, and by purchasing small equipment like data recorders, cameras, GPS units, and camping supplies necessary for this project. This portion of the match is also part of core state funding.

B. **Types of funds.** The 9.87% Montana State Library contribution is an in-kind match which will provide office space and utilities for completion of the activities related to this project. The 13.6 % MTNHP contribution for salaries is a cash match, which will be part

of the total labor cost for this project. The 3.3% MTNHP match is an in-kind match that will support the tasks involved in this project, including but not limited to data collection, data processing, data analysis, GIS creation and maintenance, database development, web updating, and information dissemination.

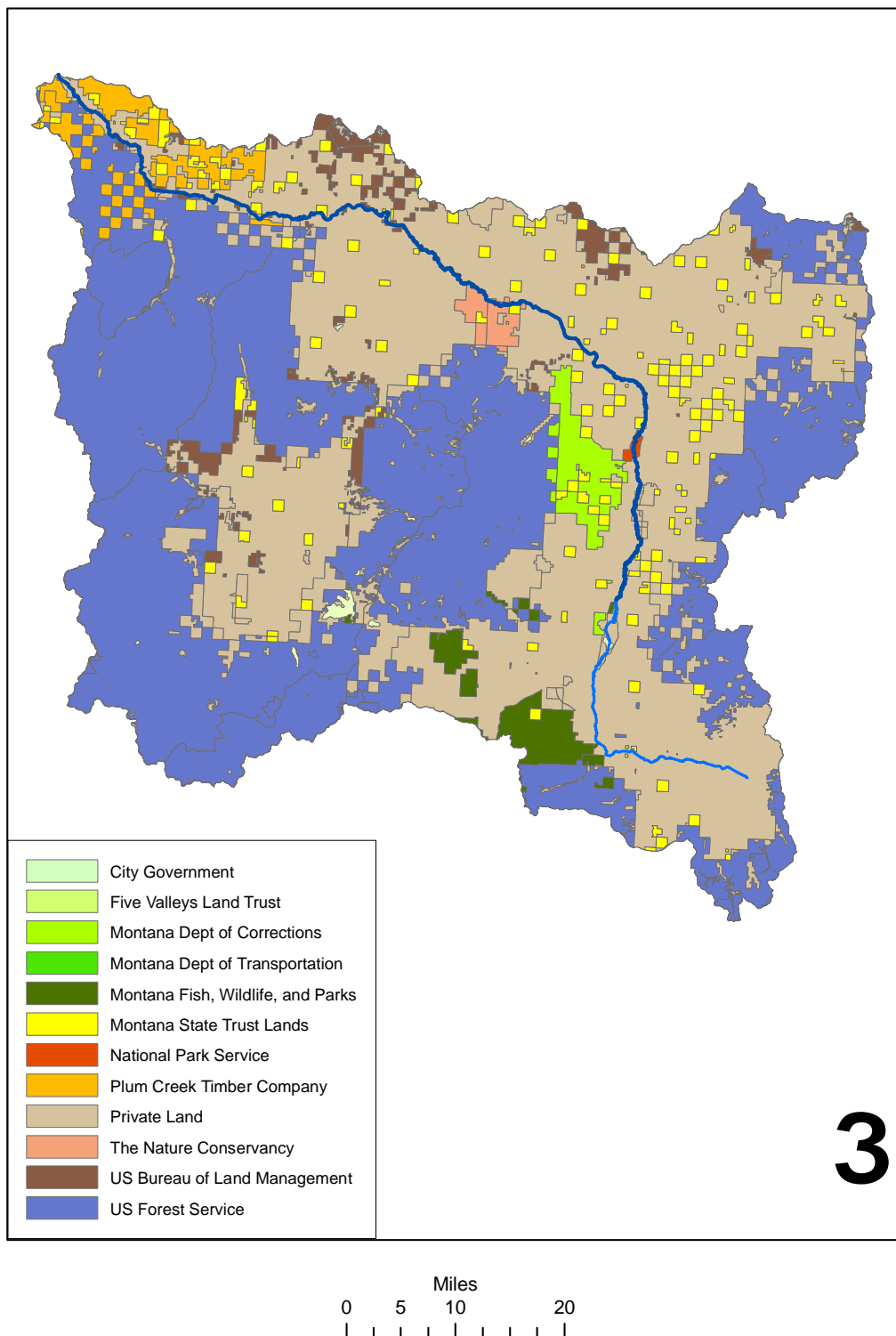
15. Public Access

A. Relevance of public access Public access is relevant to this project insofar as we will use these access points to reach sites chosen for field data collection.

B. Current status of public access. Public and private land stewardship is shown on the map on the following page. Land stewardship data compiled by MTNHP in June of 2005 shows the following breakdown within the UCFRB:

Ownership	Total Acreage
City Government	11
Five Valleys Land Trust	28
Montana Dept of Corrections	34,005
Montana Dept of Transportation	113
Montana Fish, Wildlife, and Parks	36,325
Montana State Trust Lands	80,283
National Park Service	1,594
Plum Creek Timber Company	46,742
Private Land	1,066,583
The Nature Conservancy	12,556
US Bureau of Land Management	50,813
US Forest Service	1,028,818
Water	3,450
Water - private	575
Water - reserved/withdrawn by federal agency	483

Land stewardship within study area



Over half the land within the UCFRB is in public ownership, and therefore accessible for field data collection. While we cannot specify what parcels we hope to access until completion of Tasks 3 and 4 in the Project Implementation Plan, we expect to be able to find representative sites for data collection on public land accessible by public roads.

C. Changes in public access. We do not anticipate any changes in public access as a result of this project, unless information produced hereunder is used as the basis for land acquisition. However, it is possible that the public would use public lands more to visit recreational opportunities indicated by our mapping

D. Public access points. The road network serving the study area is shown on the map on the following page.

E. Problems associated with increased public access. As indicated, public access will not change as a result of this project, although public use might. We do not believe that increased public use would be of such a magnitude as to be detrimental to response actions in the UCFRB. Additionally, our maps will be available to state and federal land management agencies, allowing them to anticipate and respond to any use trends that might harm the resource.

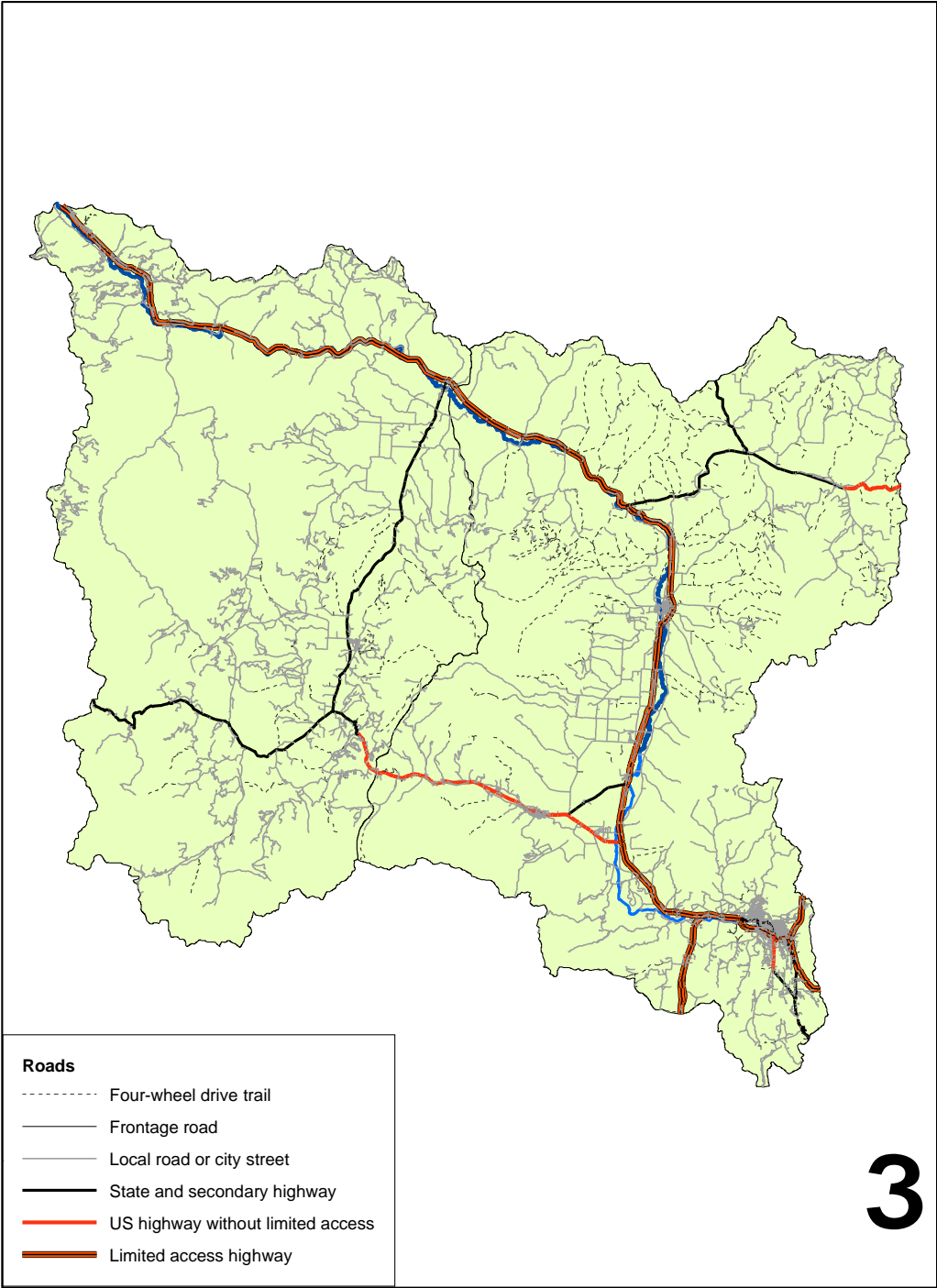
16. Ecosystem Considerations

A. Project sequencing. By its nature, this project adopts an ecosystem, watershed management approach. Instead of focusing on small areas, we are mapping the entire basin so that relationships between and among wetlands, riparian areas and uplands can be identified, analyzed, assessed, and managed. Our basin-wide wetland and riparian area assessment can provide the overall framework for subsequent management actions by state and federal agencies, private landowners, and resource managers. The Community Field Guide will encompass the entire watershed, allowing restoration planners to integrate their actions into the ecosystem as a whole by using appropriate materials.

B. Resources addressed. By mapping wetland and riparian areas, conducting a basin-wide wetland and riparian functional assessment, and creating a community field guide to vegetation, this project will address aquatic and terrestrial resources, including wetland- and riparian-dependent wildlife, fish, and biota, upland and wetland vegetation, and those surface and groundwater resources dependent on wetland filtering functions.

C. Silver Bow Creek priorities. The *Silver Bow Creek Watershed Restoration Plan* lists six restoration categories in order of prioritization: Preservation/protection of existing resources; pollution mitigation; water quality improvement; fishery restoration; vegetation/wildlife restoration; and recreation development. This project is consistent with all these priorities in that identification, mapping and assessment of wetlands/riparian function and production of a community field guide will:

Access roads within study area



- 1) promote preservation and protection of existing resources by cataloguing their extent and condition,
- 2) identify compromised wetland or riparian areas that cannot perform pollution mitigation functions, or, conversely, identify areas where restoration could have significant mitigation results, as well as identifying appropriate vegetation for pollution mitigation functions;
- 3) promote water quality improvement by indicating areas where restoration efforts would be most effective, as well as allowing restoration to occur within a basin-wide information context using native vegetation;
- 4) contribute to fishery restoration by identifying and mapping riparian function, and assisting in the selection of appropriate riparian vegetation for restoration;
- 5) support vegetation and wildlife by cataloging vegetation communities, and producing a field guide to their identification, management, and habitat value;
- 6) promote recreation development by mapping areas that support such recreation activities as hiking, fishing, hunting, birdwatching, photography, and wildlife observation.

17. Coordination and Integration

A. This project does not coordinate with specific ongoing or planned actions besides EPA response actions. However, data collected during ongoing and planned actions will be solicited for inclusion into our databases and maps. Furthermore, the completed maps, assessment and field guides will support restoration, replacement, enhancement and acquisition actions across the entire UCFRB. While maps and field guides are being completed, MTNHP scientists will be able to make preliminary information available to restoration planners, and are willing to take part in educational activities, as requested, e.g. to demonstrate methodology, discuss wetland and riparian values, or assist with plant identification.

18. Normal Government Functions

A. Government responsibility. Although the U.S. Fish and Wildlife Service mapped wetlands in the 1980s as part of the National Wetlands Inventory, over half the maps created for Montana were never put into digital format and there are no plans to do so. No other agency has assumed responsibility for systematic mapping. The Montana Department of Environmental Quality requested and received funding for a three year mapping and change detection project which will be carried out by MTNHP, but the only basins which have funding are the Bitterroot, the Flathead, and the Gallatin. Because MTNHP has assumed responsibility for mapping wetlands to NWI/US Fish and Wildlife Standards, and has the capacity to act as a clearinghouse for wetland maps, we believe ourselves to be the only organization mapping wetlands on a basin-wide scale from CIR photography at the present time. We have no funding requests pending besides this one, and we know that the Montana DEQ has not requested additional EPA funds for basin-wide mapping in the current funding cycle. Therefore, we do not consider these mapping activities to be ones that a government agency would normally be responsible for, or which would be funded by external sources during the normal course of events. The same is true for the assessment activity and the Community Field Guide; these are

projects which are typically funded because special funds become available, but on a basin-wide scale they are rarely if ever funded as part of the normal course of events. 19.

19. Desirability of Public Ownership.

There are no acquisitions of land or land interests involved in this project.

20. Price

There are no acquisitions of land or land interests involved in this project.

21. Overall Scientific Program

The Montana Natural Heritage Program is Montana's source for information on Montana's native species and habitats, emphasizing those of conservation concern. We collect, validate, and distribute this information, and assist natural resource managers and others in applying it effectively. Established by the Montana State Legislature in 1983, MTNHP is located in the Montana State Library, where it is part of the Natural Resource Information System (NRIS). Nationally, we are part of the Natural Heritage Network. Our data are linked to similar programs in all 50 states, most Canadian provinces, and many Latin American countries through NatureServe Explorer (accessible at www.natureserve.org/explorer/). Through our website, planners and managers can access maps, databases detailing plant and animal species of concern, field guides to vegetation communities, and GIS data and layers from state and federal sources. As indicated above, several thousand unique users access our website every month to peruse and download data. Simultaneously, MTNHP scientists work on contracted projects with state and federal agencies to map, assess, and document natural resources. Well over 100 reports covering these activities are available on our website.

In our basin-wide wetland and riparian area functional evaluation, we will use geographically specific data that was collected for the natural resource damage assessment during the *Montana v Arco* litigation, and for the creation of the *Silver Bow Creek Watershed Restoration Plan*, as well as data collected during previous grant-funded projects (subject to its availability). Relevant data will also be integrated into our maps as appropriate. In a similar fashion, we anticipate that the maps, field guides, and results of the basin-wide assessment created during this project will be integrated into the work of fish and wildlife scientists, hydrologists, geologists, restoration planners, and land managers at all levels of government, education, and the private sector.

22. Assistance with Restoration Planning.

Given the extent of the injury to terrestrial and aquatic resources in the UCFRB, coordinated, watershed-level restoration planning is critical. Through sustained effort, substantial work has been done to assess damages and plan response actions. However, prioritization of wetland sites for restoration, replacement, enhancement or acquisition has had to occur without the benefit of accurate maps or databases detailing the types,

functions, and distribution of those wetlands within a larger watershed context. By providing these maps, and conducting a basin-wide assessment of wetland and watershed functions, this project will enhance restoration planning at every scale. Similarly, the updated Community Field Guide will allow users to evaluate and select appropriate vegetation for sites being restored.

6. PROPOSAL BUDGET

Applicant Name: Montana Natural Heritage Program of the Nature Conservancy

Project Title: Information resources for restoration planning: basin-wide wetland/riparian maps, wetland/riparian functional assessment, and comprehensive plant community descriptions

A. Budget Estimate

The budget estimate is attached as an Excel spreadsheet on the pages following the Budget Narrative.

B. Budget Narrative

1. General Discussion

a) Salaries and wages. The major expense in this budget is personnel. Estimated staff hours listed in the budget are for project activities only. The staff listed in the budget do not include the finance/grants administrator, Darlene Patzer, or the program assistant, Pam Chriske, whose salaries and fringe come out of administrative overhead (indirect cost). We have calculated annual salary increases for all other staff at a rate of 4%. The actual increases may be less or more. Salary expenses assume that all current staff remain with the MTNHP. In the event that staff have to be replaced, we expect that the cost associated with on-the-job learning (e.g. more hours spent on the project) will be offset by lower salaries. Furthermore, we have added 5% to the estimates of staff time involved in tasks to provide for contingencies (see below).

b) Fringe benefits. Fringe benefits for all employees named in this proposal include health, dental, sick leave, annual leave, holidays, and federal and state-mandated contributions to entitlement programs. Fringe is currently calculated at 40% of salaries, but this is under review, and the actual fringe percentage at time of contracting may have changed. Actual amounts will be lower than projected if the 5% salary cushion is not used, or if it is used for temporary, non-benefited employees.

c) Supplies. This includes office and field supplies such as notebooks, paper, data forms, pens and pencils, pencils, measuring tapes, computer disks, batteries, plastic bags, desk supplies, and certain forms of computer accessories (mouse pads, portable digital storage, ink cartridges and other equipment consumed during normal use). These costs are based on our past experience with comparable projects.

d) Communications. We typically have low communications costs. The amount listed here (\$500 a year) covers long distance telephone calls to and from field personnel, cell phone use, phone cards in areas where there is no cell coverage, calls to landowners, mailing costs for access requests and reply envelopes, and mailing of reports and information to the public. In the third year, this includes the cost of printing the final report, maps, etc. These costs are based on our past experience with comparable projects.

e) Travel. There is a fairly substantial field work component in this project involving the three ecology staff, the support biologists, and (on occasion) the digitizing technician and the director. Travel is anticipated between Helena and data collection sites

in the UCFRB, and between field sites in the basin. We typically use private cars for field work, because the sites we access are not usually appropriate for rental cars. We carpool when possible, but differences in staff expertise mean that one staff person may be surveying a large amount of territory quickly while another is confined to a small area doing intense sampling. In these cases we find it necessary to use two vehicles. We have estimated mileage based on a set number of staff field days in each project year, which is also the basis for per diem calculations. Motel costs are included for approximately 40% of the field days, assuming that it will sometimes be cheaper to stay overnight than to charge round trip mileage and pay travel time to and from Helena each day. Our field trips are typically 4 to 8 days in length, and each ecologist may make 4 or 5 trips per year depending on conditions, access, and location of sites. Again, estimates of time required in the field and the mileage involved are based on our past experience with comparable projects. Per diem and mileage rates follow current state guidelines and may vary slightly from year to year.

f) Rent and utilities. Rent and utilities cover that portion and time percentage of the MTNHP offices in Helena where the bulk of this project will be conducted, as well as use of the computer network and data storage infrastructure at that location. Because the cost of office space, data storage, and networking is proportional to staff size, we calculate this amount as a percentage (15%) of staff salaries and fringe. Actual amounts will be lower than projected if the 5% salary cushion is not used

g) Equipment. This line item includes maintenance, repair and upgrading of equipment, including software and software licences. We typically upgrade our GIS software as new versions become available or as new products are released, but because the dates of future releases and the product costs are unknown, we have included equipment as an in-kind match. "Equipment" also includes replacement and repair of MTNHP-supplied field equipment (GPS units, laptops, data recorders, tape measures, cameras, etc) that become obsolete, break, or need to be purchased because staff schedules preclude sharing existing equipment. The uncertainties associated with this type of purchases makes it impossible to list individual items, so we have used estimates based on past experience.

h) Miscellaneous. We have included three items here. The first, technical training, allows for "in-service" training for new techniques and methodologies, or when staff are migrating to new equipment or software, as well as for the cost of attending technical meetings, conferences, seminars, or other events specifically relating to the activities being performed under his grant. The second item, which appears only in the first year of the budget, covers the cost of any CIR image acquisition which may be necessary to start the project. We are working in partnership with state and federal agencies to acquire this imagery without cost, so this amount may not be needed. The third, and most significant item, is our indirect cost recovery. The Nature Conservancy/MTNHP current negotiated rate (effective 07/01/05) is 22% of the direct costs applicable to a given project (actual amounts will be lower than projected if the 5% salary cushion is not used). There are no loans or interest expenses associated with this grant.

2. Contingency planning. Because the highest cost item in this project is salary and fringe, this is the area most susceptible to cost overruns. Such overruns could occur, for example, if representative field sites were not available in easily accessible areas, and

staff had to spend more time in travel status, or if technical problems with image analysis and digitizing resulted in more person-hours being spent on problem-solving. However, we believe that the most likely scenario is certain tasks taking longer than expected and other tasks being completed more quickly. Moreover, our scientists have multidisciplinary backgrounds which allow them to cross-over from one area of concentration to another (e.g., our director is a skilled botanist, the senior ecologist is skilled in photointerpretation, the wetlands ecologist can perform statistical analyses of community vegetation data, and so forth). In the event that unexpected delays occur, the 5% cushion in the hour estimates should suffice for completion, either through extension of staff time or short-term/part-time hiring of technicians.

3. Other considerations The MTNHP is a statutory program, but is operated by The Nature Conservancy (TNC) under contract to the Montana State Library. All MTNHP are TNC employees, and all assets are owned by TNC. However, negotiations are currently underway to transfer the operating contract, all assets, and all employees to the University of Montana. This transfer, if it occurs, will take place some time after June 30, 2006. All staff listed in this grant would remain with the MTNHP, and hourly rates would remain the same. However, the calculated fringe percentage would probably rise to meet UMT benefit standards, while indirect could drop. UMT indirect is currently 20%.

BUDGET DETAIL FORM YEAR 1									
EXPENSE CATEGORY		UCFRB RESTORATION GRANT FUND	APPLICANT CONTRIBUTION			OUTSIDE SOURCES			TOTAL
			Cash	In-Kind	Subtotal	Cash	In-Kind	Subtotal	
1	SALARIES AND WAGES (List all worker salaries)								
	L. Vance, Wetland ecologist (960 hrs @ \$25/hr)	\$ 24,000.00							
	S. Cooper, Vegetation ecologist (320 hrs @ \$25/hr)	\$ 8,000.00							
	G. Kudray, Senior ecologist (240 hrs @ \$25/hr)	\$ 6,000.00							
	Digitizing technician (880 hrs @ \$16/hr)	\$ 14,080.00							
	S. Blum, Support biologist (56 hrs @ \$16/r)	\$ 896.00							
	C. Currier, Support biologist (24 hrs @ \$16/hr)	\$ 384.00							
	D. Ratz, Web Developer, 16 hrs @ \$23/hr	\$ 368.00							
	K. Walker, Data Coordinator, 80 hrs @ \$23/hr	\$ 1,840.00							
	A. Cox, Systems/Services Manager, 240 hrs @ \$25/hr		\$ 6,000.00						
	S. Crispin, Director, (240 hrs @ \$ 32/hr)		\$ 7,680.00						
	Insert Row								
	SALARIES AND WAGES SUBTOTAL	\$ 55,568.00	\$ 13,680.00		\$ 13,680.00				\$ 69,248.00

FRINGE BENEFITS @ 40%	\$ 22,227.20	\$ 5,472.00						
Health, State & Federal levies, leave, holidays								
Insert Row								
FRINGE BENEFITS SUBTOTAL	\$ 22,227.20	\$ 5,472.00		\$ 5,472.00				\$ 27,699.20
CONTRACTED SERVICES (LIST BY TYPE)								
Insert Row								
CONTRACTED SERVICES SUBTOTAL								
SUPPLIES AND MATERIALS	\$ 1,200.00							
Office and field supplies, accessories, books								
Insert Row								
SUPPLIES AND MATERIALS SUBTOTAL	\$ 1,200.00							\$ 1,200.00
COMMUNICATIONS	\$ 500.00							
Telephone, cell phone, phone cards, mailing								
Insert Row								
COMMUNICATIONS SUBTOTAL	\$ 500.00							\$ 500.00

Budget Detail, year 1, continued

TRAVEL								
per diem at \$23/day for 65 days	\$ 1,495.00							
6500 .miles at 44.5 cents/mile	\$ 2,892.50							
Motel. (25 nights @ 60/night)	\$ 1,500.00							
Insert Row								
TRAVEL SUBTOTAL	\$ 5,887.50							\$ 5,887.50
RENT AND UTILITIES						\$ 14,542.08		
..								
Insert Row								
RENT AND UTILITIES SUBTOTAL						\$ 14,542.08	\$ 14,542.08	\$ 14,542.08
EQUIPMENT								
Maintenance, repair, upgrading equipment			\$ 5,520.00					
Insert Row								
EQUIPMENT SUBTOTAL			\$ 5,520.00	\$ 5,520.00				\$ 5,520.00

Budget detail, year 1, continued

9	MISCELLANEOUS								
	Project training including upgrading technical training	\$ 4,312.00							
	Image acquisition (CIR innagery)	\$ 2,000.00							
	Indirect cost @ 20% of direct expenses	\$ 25,600.67							
	Insert Row								
	MISCELLANEOUS SUBTOTAL	\$ 31,912.67							\$ 31,912.67
	ALL CATEGORIES SUBTOTAL	\$ 117,295.37	\$ 19,152.00	\$ 5,520.00	\$ 24,672.00		\$ 14,542.08	\$ 14,542.08	\$ 156,509.45

Budget detail, year 1, continued

BUDGET DETAIL FORM YEAR 2									
EXPENSE CATEGORY		UCFRB RESTORATION GRANT FUND	APPLICANT CONTRIBUTION			OUTSIDE SOURCES			TOTAL
			Cash	In-Kind	Subtotal	Cash	In-Kind	Subtotal	
1	SALARIES AND WAGES (List all worker salaries)								
	L.Vance, Wetland ecologist (960 hrs @ \$26/hr)	\$ 24,960.00							
	S.Cooper, Vegetation ecologist (480 hrs @ \$26/hr)	\$ 12,480.00							
	G. Kudray, Senior ecologist (240 hrs @ \$26/hr)	\$ 6,240.00							
	Digitizing technician (1000 hrs @ \$16.65/hr)	\$ 16,650.00							
	S. Blum, Support biologist (64 hrs @ \$16.65/r)	\$ 1,065.60							
	C. Currier, Support biologist (24 hrs @ \$16.65/hr)	\$ 399.60							
	D. Ratz, Web Developer, 80 hrs @ \$23.92/hr	\$ 1,913.60							
	K. Walker, Data Coordinator, 176 hrs @ \$23.92/hr	\$ 4,209.92							
	A. Cox, Systems/Services Manager, 320 hrs @ \$26/hr		\$ 8,320.00						
	S. Crispin, Director, (320 hrs @ \$ 33.25/hr)		\$ 10,640.00						
	Insert Row								
	SALARIES AND WAGES SUBTOTAL	\$ 67,918.72	\$ 18,960.00		\$ 18,960.00				\$ 86,878.72

FRINGE BENEFITS @ 40%								
Health, state & federal levies, leave, holidays	\$ 27,167.49	\$ 7,584.00						
Insert Row								
FRINGE BENEFITS SUBTOTAL	\$ 27,167.49	\$ 7,584.00		\$ 7,584.00				\$ 34,751.49
CONTRACTED SERVICES (LIST BY TYPE)								
Insert Row								
CONTRACTED SERVICES SUBTOTAL								
SUPPLIES AND MATERIALS								
Office and field supplies, accessories, books	\$ 1,200.00							
Insert Row								
SUPPLIES AND MATERIALS SUBTOTAL	\$ 1,200.00							\$ 1,200.00
COMMUNICATIONS								
Telephone, cell phone , phone cards, mailing	\$ 500.00							
Insert Row								
COMMUNICATIONS SUBTOTAL	\$ 500.00							\$ 500.00

Budget detail, year 2, continued

TRAVEL								
per diem at \$23/day for 70 days	\$ 1,610.00							
7000 miles at 44.5 cents/mile	\$ 3,115.00							
Motel (25 nights @ 60/night)	\$ 1,500.00							
Insert Row								
TRAVEL SUBTOTAL	\$ 6,225.00							\$ 6,225.00
RENT AND UTILITIES						\$ 18,989.70		
Insert Row								
RENT AND UTILITIES SUBTOTAL						\$ 18,989.70	\$ 18,989.70	\$ 18,989.70
EQUIPMENT								
Maintenance, repair, upgrading equipment.			\$ 6,700.00					
Insert Row								
EQUIPMENT SUBTOTAL			\$ 6,700.00	\$ 6,700.00				\$ 6,700.00

Budget detail, year 2, continued

9	MISCELLANEOUS								
	Project training including upgrading technical training	\$ 4,798.00							
	Indirect cost @ 22% of direct expenses	\$ 31,031.71							
	Insert Row								
	MISCELLANEOUS SUBTOTAL	\$ 35,829.71							\$ 35,829.71
	ALL CATEGORIES SUBTOTAL	\$ 138,840.91	\$ 26,544.00	\$ 6,700.00	\$ 33,244.00		\$ 18,989.70	\$ 18,989.70	\$ 191,074.62

Budget detail form, year 2, continued

EXPENSE CATEGORY		UCFRB RESTORATION GRANT FUND	APPLICANT CONTRIBUTION			OUTSIDE SOURCES			TOTAL
			Cash	In-Kind	Subtotal	Cash	In-Kind	Subtotal	
1	SALARIES AND WAGES (List all worker salaries)								
	L. Vance, Wetland ecologist (880 hrs @\$27/hr).	\$ 23,760.00							
	S. Cooper, Vegetation ecologist (400 hrs @ \$27/hr)	\$ 10,800.00							
	G. Kudray, Senior ecologist (480 hrs @ \$27/hr)	\$ 12,960.00							
	Digitizing technician (640 hrs @\$17.25/hr)	\$ 11,040.00							
	S. Blum, Support biologist (16 hrs @\$17.25/r)	\$ 276.00							
	C. Currier, Support biologist (72 hrs @\$17.25/hr)	\$ 1,242.00							
	D. Ratz, Web Developer, 156 hrs @ \$25/hr	\$ 3,900.00							
	K.Walker,Data Coordinator, (288 hrs @ \$25/hr)	\$ 7,200.00							
	A. Cox, Systems/Services Manager, (320 hrs @ \$27/hr)		\$ 8,640.00						
	S.Crispin, Director, (320 hrs @ \$ 34.50/hr)		\$ 11,040.00						
	Insert Row								
	SALARIES AND WAGES SUBTOTAL	\$ 71,178.00	\$ 19,680.00		\$ 19,680.00				\$ 90,858.00

FRINGE BENEFITS								
Health, state and federal levies, leave, holidays	\$ 28,471.20	\$ 7,872.00						
Insert Row								
FRINGE BENEFITS SUBTOTAL	\$ 28,471.20	\$ 7,872.00		\$ 7,872.00				\$ 36,343.20
CONTRACTED SERVICES (LIST BY TYPE)								
Insert Row								
CONTRACTED SERVICES SUBTOTAL								
SUPPLIES AND MATERIALS								
Office and field supplies, accessories, books	\$ 700.00							
Insert Row								
SUPPLIES AND MATERIALS SUBTOTAL	\$ 700.00							\$ 700.00
COMMUNICATIONS								
Telephone, cell phone, phone cards, mailing	\$ 500.00							
Report printing	\$400							
Insert Row								
COMMUNICATIONS SUBTOTAL	\$ 900.00							\$ 900.00

Budget detail, year 3, continued

TRAVEL								
per diem at \$23/day for 15 days ..	\$ 345.00							
1500 miles at 44.5 cents/mile	\$ 667.50							
Motel (5 nights @ 60/night)	\$ 300.00							
Insert Row								
TRAVEL SUBTOTAL	\$ 1,312.50							\$ 1,312.50
RENT AND UTILITIES						\$ 19,615.48		
Insert Row								
RENT AND UTILITIES SUBTOTAL						\$ 19,615.48	\$ 19,615.48	\$ 19,615.48
EQUIPMENT								
Maintenance, repair and upgrading equipment.			\$ 5,392.00					
Insert Row								
EQUIPMENT SUBTOTAL			\$ 5,392.00	\$ 5,392.00				\$ 5,392.00

Budget detail, year 3, continued

9	MISCELLANEOUS								
	Project training, including upgrading technical training	\$ 4,923.00							
	Indirect cost @ 20% of direct expenses	\$ 30,894.31							
	Insert Row								
	MISCELLANEOUS SUBTOTAL	\$ 35,817.31							\$ 35,817.31
	ALL CATEGORIES SUBTOTAL	\$ 138,379.01	\$ 27,552.00	\$ 5,392.00	\$ 32,944.00		\$ 19,615.48	\$ 19,615.48	\$ 190,938.49

Budget detail, year 3, continued

PROJECT BUDGET SUMMARY FORM (All Years)										
EXPENSE CATEGORY			UCFRB RESTORATION FUND	APPLICANT CONTRIBUTION			OUTSIDE SOURCES			TOTAL
				Cash	In-Kind	Subtotal	Cash	In-Kind	Subtotal	
1	YEAR 1	SALARIES AND WAGES	\$55,568.00	\$13,680.00		\$13,680.00				\$69,248.00
	YEAR 2	SALARIES AND WAGES	\$67,918.72	\$18,960.00		\$18,960.00				\$86,878.72
	YEAR 3	SALARIES AND WAGES	\$71,178.00	\$19,680.00		\$19,680.00				\$90,858.00
	SALARIES AND WAGES SUBTOTAL		\$194,664.72	\$52,320.00		\$52,320.00				\$246,984.72
2	YEAR 1	FRINGE BENEFITS	\$22,227.20	\$5,472.00		\$5,472.00				\$27,699.20
	YEAR 2	FRINGE BENEFITS	\$27,167.49	\$7,584.00		\$7,584.00				\$34,751.49
	YEAR 3	FRINGE BENEFITS	\$28,471.20	\$7,872.00		\$7,872.00				\$36,343.20
	FRINGE BENEFITS SUBTOTAL		\$77,865.89	\$20,928.00		\$20,928.00				\$98,793.89
3	YEAR 1	CONTRACTED SERVICES								
	YEAR 2	CONTRACTED SERVICES								
	YEAR 3	CONTRACTED SERVICES								
	CONTRACTED SERVICES SUBTOTAL									
4	YEAR 1	SUPPLIES AND MATERIALS	\$1,200.00							\$1,200.00
	YEAR 2	SUPPLIES AND MATERIALS	\$1,200.00							\$1,200.00
	YEAR 3	SUPPLIES AND MATERIALS	\$ 2,400.00							\$ 2,400.00
	SUPPLIES AND MATERIALS SUBTOTAL		\$4,800.00							\$4,800.00
5	YEAR 1	COMMUNICATIONS	\$500.00							\$500.00
	YEAR 2	COMMUNICATIONS	\$500.00							\$500.00
	YEAR 3	COMMUNICATIONS	\$900.00							\$900.00
	COMMUNICATIONS SUBTOTAL		\$1,900.00							\$1,900.00
6	YEAR 1	TRAVEL	\$5,887.50							\$5,887.50
	YEAR 2	TRAVEL	\$6,225.00							\$6,225.00
	YEAR 3	TRAVEL	\$1,312.50							\$1,312.50
	TRAVEL SUBTOTAL		\$13,425.00							\$13,425.00
7	YEAR 1	RENT AND UTILITIES						\$14,542.08	\$14,542.08	\$14,542.08
	YEAR 2	RENT AND UTILITIES						\$18,989.70	\$18,989.70	\$18,989.70
	YEAR 3	RENT AND UTILITIES						\$19,615.48	\$19,615.48	\$19,615.48
	RENT AND UTILITIES SUBTOTAL							\$53,147.26	\$53,147.26	\$53,147.26
8	YEAR 1	EQUIPMENT			\$5,520.00	\$5,520.00				\$5,520.00
	YEAR 2	EQUIPMENT			\$6,700.00	\$6,700.00				\$6,700.00
	YEAR 3	EQUIPMENT			\$5,392.00	\$5,392.00				\$5,392.00
	EQUIPMENT SUBTOTAL				\$17,612.00	\$17,612.00				\$17,612.00
9	YEAR 1	MISCELLANEOUS	\$31,912.67							\$31,912.67
	YEAR 2	MISCELLANEOUS	\$35,829.71							\$35,829.71
	YEAR 3	MISCELLANEOUS	\$35,817.31							\$35,817.31
	MISCELLANEOUS SUBTOTAL		\$103,559.69							\$103,559.69
YEAR 1 TOTAL			\$117,295.37	\$19,152.00	\$5,520.00	\$24,672.00		\$14,542.08	\$14,542.08	\$156,509.45
YEAR 2 TOTAL			\$138,840.91	\$26,544.00	\$6,700.00	\$33,244.00		\$18,989.70	\$18,989.70	\$191,074.62
YEAR 3 TOTAL			\$138,379.01	\$27,552.00	\$5,392.00	\$32,944.00		\$19,615.48	\$19,615.48	\$190,938.49
ALL YEAR TOTAL			\$394,515.30	\$73,248.00	\$17,612.00	\$90,860.00		\$53,147.26	\$53,147.26	\$538,522.56

APPENDIX A: SUPPORTING LEGAL DOCUMENTS

The Montana Natural Heritage Program is part of The Nature Conservancy, a 501(c)(3) corporation incorporated under the laws of the District of Columbia, and doing business in Montana under a Certificate of Authority dated 06/03/1970. The Nature Conservancy files corporate annual reports in Montana through The Nature Conservancy of Montana, Inc. Certificates of Fact for both entities are included here, as well as the relevant corporate documents.

ARTICLES OF ORGANIZATION of THE NATURE CONSERVANCY

The Nature Conservancy is incorporated as a nonprofit corporation under the laws of the District of Columbia. Articles of Incorporation were filed on October 22, 1951 and amended on November 23, 1959. The Corporation has elected to come under the District of Columbia Nonprofit Corporation Act. A Statement to Elect that act was filed on February 27, 1998, amended on March 11, 1998 and further amended on March 20, 1998.

FIRST: The name of the corporation shall be The Nature Conservancy (hereinafter also referred to as "TNC"). The period of duration of the corporation shall be perpetual.

SECOND: The Corporation has elected to accept the provisions of Title 29, Chapter 5 of the District of Columbia Code, 1981 ed.

THIRD: TNC shall have one or more classes of members as set forth in the bylaws, but such members shall not be entitled to vote.

FOURTH: The election to accept the District of Columbia Nonprofit Corporation Act was adopted by resolution of the Board of Governors (Board of Directors being designated as Board of Governors) of the Corporation at a meeting duly called and held on January 30, 1998. A statement as to the manner in which Governors shall be elected or appointed, if the Governors or any of them are not to be elected or appointed by one or more classes of members shall be provided in the bylaws. Such resolution was adopted by a majority of the members of the Board in accordance with Section 29-599.3.

FIFTH: This corporation is organized exclusively for educational, scientific, and charitable purposes as may qualify it for tax-exempt status under Section 501(c)(3) of the Internal Revenue Code of 1954 (or the corresponding provision of any future United States Internal Revenue Law). More specifically, the mission of TNC is to preserve plants, animals, and natural communities that represent the diversity of life on Earth by protecting the lands and waters they need to survive. In furtherance of its corporate purposes, TNC shall have all the general powers enumerated in §29-505 of the District of Columbia Nonprofit Corporation Act, as now in effect or as may hereafter be amended, together with the power to solicit grants and contributions for such purposes. TNC may receive property by gift, devise or bequest, invest and reinvest the same, and apply the income and principal thereof, as the Board of Governors may from time to time determine.

SIXTH: The Corporation shall have and exercise all powers necessary or convenient to effect any or all of the purposes for which the Corporation is organized, including the power to hold property. In the event of dissolution or final liquidation of the Corporation, all of the remaining assets and property of the Corporation, after paying or making provision for the payment of all of the liabilities and obligations of the Corporation and for necessary expenses thereof, shall be distributed to such organization or organizations as the Board of Governors shall determine which are organized and operated exclusively for charitable, scientific, literary or educational purposes and as shall at the time qualify as exempt from taxation as an organization or organizations described in Section 501(c)(3) of the Code, or the corresponding provision of any future federal tax code. In no event shall any of such assets or property be distributed to any Member, Governor or Officer of the Corporation, or any private individual.

SEVENTH: The provisions set forth herein supersede TNC's original Articles of Incorporation, all amendments thereto and all restatements thereof, and constitute the official organizing document of the Corporation. Unless otherwise provided by applicable law, the internal affairs of the Corporation shall be regulated by the bylaws of the Corporation.

EIGHTH: The address of the registered office of the Corporation in the District of Columbia is 1025 Vermont Avenue, N.W., Washington, DC 20005, and the name of its registered agent at such address is C T Corporation System.

NINTH: The names and addresses of the Corporation's Officers and Governors are listed on Exhibit A incorporated herein by reference in its entirety.

THE NATURE CONSERVANCY

EXHIBIT A

Statement of Election

The names and address of the Corporation's officers and Governors are:

President & Chief Executive Officer: Steven McCormick

Chair: Daniel Efroymson

Vice Chairs: Anthony P. Grassi, Wendy J. Paulson

Secretary: Louisa C. Duemling

Treasurer: Ward W. Woods

Richard A. Abdoo

Carter F. Bales

David C. Cole

Alston Dayton Correll, Jr.

Ian M. Cumming

Livio D. DeSimone

Carol E. Dinkins

Dr. Mary Fleming Finlay

Dr. John W. Fitzpatrick

Dr. David Pierpont Gardner

I. Lamond Godwin

Arturo Gómez-Pompa

Dr. Ralph J. Gutiérrez

John W. Hanes

John S. Hendricks

Kate Ireland

Durk I. Jager

Frances C. James

Philip J. James

Glenn Cooper Janss

Samuel C. Johnson

Dr. Peter M. Kareiva

Barbara A. Lipscomb
Meredith Meiling
Alfredo Novoa Peña
Leigh H. Perkins, Jr.
General H. Norman Schwarzkopf
John G. Smale
John F. Smith, Jr.
Howard Stringer
Dr. Cameron M. Vowell
Jeffrey N. Watanabe
The Honorable John C. Whitehead
Dr. Edward Osborne Wilson
Dr. Joy Buswell Zedler

The Nature Conservancy
4245 North Fairfax Drive
Arlington VA 22203

Bylaws of The Nature Conservancy

As Amended and Restated April 25, 2005

Section 1

Name

The name of this corporation is The Nature Conservancy (“TNC”). TNC is a nonprofit corporation organized and existing under the laws of the District of Columbia.

Section 2

Purposes

The Nature Conservancy is organized, and shall be operated, exclusively for educational, scientific and charitable purposes as may qualify it for tax exempt status under section 501(c)(3) of the Internal Revenue Code (or the corresponding provision of any future United States Internal Revenue Law). More specifically, the mission of TNC is to preserve plants, animals, and natural communities that represent the diversity of life on Earth by protecting the lands and waters they need to survive.

Section 3

Membership

1. **Eligibility.** Any responsible individual or organization approving of the objectives of TNC shall be eligible for membership. The dues for members shall be determined by such procedures as may be established by the Board.
2. **Classes.** TNC shall have the following classes of members: honorary, life, annual, and corporate. The qualifications of each class shall be determined from time to time by the Board.
3. **Duration.** Honorary and life members, who are eighteen years or more of age, shall hold membership for life and annual members and corporate members shall hold membership for periods of one year, in accordance with procedures to be established by the Board.

Section 4

Board of Directors

1. **Composition.** The Board of Directors shall consist of not less than nine nor more than twenty-one members, including the President, as determined by the Board. The members shall be chosen, insofar as possible, to represent the varied interests and areas of expertise and competency that are of concern to TNC.
2. **Functions.** The Board of Directors shall be responsible for all business of TNC and shall determine matters of policy. The Board may also make rules and regulations governing the establishment and operation of affiliated units of TNC.
3. **Terms.** Members of the Board shall be elected for terms not to exceed three years. No member shall serve more than three consecutive three-year terms, except under the following circumstances:
 1. An incoming member who has been elected to fill a vacant position on the Board may serve until the date of the next annual meeting, and, if then reelected, will be eligible to serve three additional full three-year terms.
 2. At the election of the Board, an outgoing Chair of the Board who has completed his or her third consecutive term as a Board member, and whose service on the Board would otherwise expire, may serve an additional one-year term as a member of the Board;
 3. The President’s term on the Board shall be coterminous with his or her service as President of TNC.

4. **Leave of Absence.** A member of the Board of Directors may, at the direction of the Board of Directors, take a leave of absence of up to one year, said leave not to be charged against the member's term of office.

Section 5

Committees, Sub-committees, Advisory Councils

1. **Executive Committee.** There shall be an Executive Committee which shall consist of the elective officers, the President and the chairs of any standing committees of the Board of Directors. Action taken at any meeting of the Executive Committee will be reported no later than the next scheduled meeting of the Board of Directors. The Executive Committee shall have and may exercise when the Board of Directors is not in session all the powers of the Board that may be lawfully delegated, provided that the Committee shall not make final determinations of policy.
2. **Standing Committees.** The standing committees of The Nature Conservancy shall be the committees as established by these Bylaws. There shall be three standing committees: a Governance, Nominating and Human Resources Committee, an Audit Committee, and a Finance Committee. The chair and the members of each standing committee shall be appointed by the Chair of the Board of Directors. It is contemplated that the Chair of the Board, although not obligated to do so, will appoint the Treasurer to serve as the chair of the Finance Committee. The responsibilities of each standing committee shall be set forth in a committee charter which shall be reviewed from time to time by the Board and revised, as appropriate.
 1. **The Governance, Nominating and Human Resources Committee** shall present recommendations for elective officers and Directors to the Board of Directors and shall consult with the Chair of the Board with respect to the process by which members of the Board are assigned to committees. The Committee shall assist the Board of Directors by monitoring the overall management and governance structures of the organization, by evaluating senior executive performance and compensation and by overseeing policies regarding Board composition and performance.
 2. **The Audit Committee** shall assist the Board of Directors in its oversight and monitoring the Conservancy's systems of internal controls and risk mitigation, in ensuring compliance with legal and ethical standards and in selecting and hiring of the internal and independent auditors.
 3. **The Finance Committee** shall assist the Board of Directors in its oversight responsibilities relating to fiscal management of organization-wide financial assets.
3. **Other Committees, Sub-Committees, and Advisory Councils.** The Board may establish by resolution such other committees, sub-committees, and advisory councils as it deems appropriate.
4. The President shall not serve on any committee other than the Executive Committee.

Section 6

Officers

1. **Titles and Terms of Elective Officers.** The elective officers of TNC shall be a Chair of the Board, not more than three Vice-Chairs, a Secretary and a Treasurer, who shall be elected for terms not to exceed three years.
2. **Titles and Terms of Appointive Officers.** The appointive officers of TNC shall be a President, an Assistant Treasurer, and such number of Vice-Presidents and Assistant

3. Secretaries as the Board may determine, who shall be appointed for one-year terms to be automatically renewed every year unless the Board determines otherwise.
4. **President.** The President shall be the Chief Executive Officer of TNC and shall report to and be a member of the Board of Directors. He or she will be responsible for providing broad leadership and direction to the organization and for arranging meetings of the Board. Major responsibilities will include providing the Board of Directors with periodic reports on the condition of the organization and on external developments which can influence TNC's future, and providing consistent progress towards achievement of the organization's vision, mission, and financial objectives. The President will establish and maintain management systems needed to ensure and report on the implementation of Board established policies. The President will serve as the chief spokesperson for the organization and represent it to appropriate outside groups.
5. **Chair of the Board.** The Chair of the Board shall be the senior officer of TNC and shall have general responsibility for the functioning of TNC between meetings of the Board of Directors or the Executive Committee. He or she shall preside at meetings of TNC's Board of Directors and the Executive Committee.
6. **Vice Chair of the Board.** The Vice Chair of the Board shall exercise the functions of the Chair in his or her absence. If there is more than one Vice Chair, they shall, in consultation with one another, determine the manner in which those functions shall be carried out.
7. **Secretary.** The Secretary shall be responsible for the keeping of minutes of all meetings of the Board of Directors and Executive Committee, and for the performance of all duties normally pertaining to the Office of Secretary.
8. **Treasurer.** The Treasurer shall be responsible for advising the Board of Directors and the Executive Committee on fiscal matters.
9. **Assistant Secretaries and Assistant Treasurer.** The Assistant Secretaries and the Assistant Treasurer are employees of TNC who are appointed to their offices by the Board in accordance with these bylaws. The duties of the Assistant Secretaries and the duties of the Assistant Treasurer shall include exercising the functions of the Secretary and the Treasurer, respectively, in their absence.

Section 7

Meetings

1. **Frequency.** There shall be an annual meeting of the Board of Directors at the call of the Chair of the Board or the President. The Board shall hold no fewer than four in-person meetings annually. Other meetings of the Board of Directors or of the Executive Committee may be held, in person or telephonically, at the call of the Chair of the Board or the President. The Chair of the Board or the President shall also call meetings of the Board or of the Executive Committee when requested in writing by a quorum of the Board of Directors or by a quorum of the Executive Committee. Meetings of any other committee of the Board may be held at the call of the Chair of that committee.
2. **Notice.** Reasonable notice shall be given of meetings of the Board of Directors or any of its committees.
3. **Quorums.** One-third of the Board of Directors shall constitute a quorum for the transaction of business of the Board. A majority of the members of the Executive Committee shall constitute a quorum for the transaction of business by such committee. In the absence of a quorum at a duly called meeting, a lesser number may adjourn the meeting from time to time until a quorum shall be present.

4. **Proxies.** The Board of Directors may make provision for the use of proxies to vote on any question which may come before any meeting of the Board or any of its committees which proxies shall be used to meet the requirements for a quorum.
5. **Special Provision.** The Executive Committee and any other committees established by the Board may transact business at a meeting, by a telephone conference call, fax, e-mail, or by any other method of communication in accordance with standard business practices.
6. **Emergency Provision.** At the call of the Chair or President, the Board of Directors may transact business without a meeting, provided that any such actions taken shall be with the prior written consent of all the members of the Board of Directors.

Section 8

Nominations and Elections

1. **Nominations.** Prior to the annual meeting of the Board, the Governance, Nominating and Human Resources Committee shall present to the Board nominations for membership to the Board of Directors and elective officers thereof to be acted upon at the annual meeting. All nominations shall be included in the notice of the meeting. The consent of the nominee shall be obtained before his or her name is presented.
2. **Election.** Election shall be by a majority of votes cast by the Board of Directors. The Board may make provision for the casting of votes by mail, phone, fax, e-mail, or other methods of communication in accordance with standard business practices.
3. **Vacated or Empty Positions.** The Board of Directors may appoint a person to fill any vacated or empty positions among the elective officers or members at large of the Board of Directors. A person so appointed shall serve until the next annual meeting.

Section 9

Fiscal Policies

1. **Fiscal Year.** The fiscal year for all business transactions of TNC shall be from July 1 of one year through June 30 of the following year.
2. **Disbursements.** Disbursements shall be made only in accordance with a specific authorization or a general budget approved by the Board of Directors and on such terms, including appropriate provisions for bonds, as may be established by the Board.
3. **Audits.** There shall be an annual audit of TNC by an independent certified public accountant. The independent auditor shall be appointed annually by the Board upon the recommendation of the Audit Committee, and shall report to the Audit Committee. The fees for the independent auditor shall be set by the Audit Committee. No less frequently than every five years, the Audit Committee shall recommend whether a new independent auditor should be selected; if the then-current auditor is retained, a new lead partner or officer shall be selected. The Board of Directors, upon the recommendation of the Audit Committee, may direct the audit of offices, programs and activities of TNC at such times and in such a manner as it may specify.

Section 10

Indemnification

Any Board member or other person who performs services for the corporation at the request of TNC and who does not receive compensation other than reimbursement of expenses shall be immune from civil liability to the extent provided by applicable law.

Each director, governor, or officer of TNC shall discharge his or her respective duties in compliance with the standards of the law of the District of Columbia, including, without limitation: (a) in good

faith; **(b)** with the care an ordinarily prudent person in a like position would exercise under similar circumstances; and **(c)** in a manner such director, governor or officer reasonably believes to be in the best interests of the corporation, as determined by TNC.

TNC shall, to the fullest extent now or hereafter permitted by law, indemnify any director, governor, chapter trustee, international or domestic advisory board or advisory council member, officer, or employee, or former director, governor, chapter trustee, international or domestic advisory board or advisory council member, officer, employee, or any person who may have served at its express request as a director, governor, trustee, officer, employee, or agent of another corporation, partnership, joint venture, trust or other enterprise, whether for profit or not for profit, against liability (including but not limited to judgments, fines, amounts paid in settlement, attorneys' fees, and related expenses) incurred in the performance of such duties or service, or incurred while acting in such capacity or arising out of his or her status as such, provided that person acted in good faith and in a manner reasonably believed to be in, or not opposed to, the best interests of TNC, as determined by TNC, and, with respect to any criminal action or proceeding, had no reasonable cause to believe that such conduct was unlawful or fraudulent. TNC shall also indemnify directors and officers as required pursuant to applicable law.

TNC shall have the right to select attorneys and to approve any settlements or legal expenses incurred in connection with any suit, action or proceeding to which this indemnification applies.

Section 11

Amendments

These bylaws may be amended by two-thirds vote of the members of the Board of Directors in office, upon written notice at least ten days prior to any meeting of the Board of Directors.

Summary of Articles of Incorporation of The Nature Conservancy

Filed with the District of Columbia

The Nature Conservancy is incorporated as a nonprofit corporation under the laws of the District of Columbia. Articles of Incorporation were filed on October 22, 1951 and amended on November 23, 1959. The Corporation has elected to come under the District of Columbia Nonprofit Corporation Act. A Statement to Elect that act was filed on February 27, 1998, amended on March 11, 1998 and further amended on March 20, 1998.

Relevant excerpts from The Statement of Election To Accept follow:

The name of the corporation shall be The Nature Conservancy (hereinafter also referred to as "TNC"). The period of duration of the corporation shall be perpetual.

The Corporation has elected to accept the provisions of Title 29, Chapter 5 of the District of Columbia Code, 1981 ed.

TNC shall have one or more classes of members as set forth in the bylaws but such members shall not be entitled to vote.

The election to accept the District of Columbia Nonprofit Corporation Act was adopted by resolution of the Board of Governors Board of Directors being designated as Board of Governors) of the Corporation at a meeting duly called and held on January 30, 1998. A statement as to the manner in which Governors shall be elected or appointed, if the Governors or any of them are not to be elected or appointed by one or more classes of members shall be provided in the bylaws. Such resolution was adopted by a majority of the members of the Board in accordance with Section 29-599.3.

This corporation is organized exclusively for educational, scientific, and charitable purposes as may qualify it for tax-exempt status under Section 501(c)(3) of the Internal Revenue Code of 1954 (or the corresponding provision of any future United States Internal Revenue Law). More specifically the Mission of TNC is to preserve plants, animals, and natural communities that represent the diversity of life on Earth by protecting the lands and waters they need to survive. In furtherance of its corporate purposes, TNC shall have all the general powers enumerated in §29-505 of the District of Columbia Nonprofit Corporation Act, as now in effect or as may hereafter be amended, together with the power to solicit grants and contributions for such purposes. TNC may receive property by gift, devise or bequest, invest and reinvest the same, and apply the income and principal thereof, as the Board of Governors may from time to time determine.

The Corporation shall have and exercise all powers necessary or convenient to effect any or all of the purposes for which the Corporation is organized, including the power to hold property. In the event of dissolution or final liquidation of the Corporation, all of the remaining assets and property of the Corporation, after paying or making provision for the payment of all of the liabilities and obligations of the Corporation and for necessary expenses thereof, shall be distributed to such organization or organizations as the Board of Governors shall determine which are organized and operated exclusively for charitable, scientific, literary or educational purposes and as shall at the time qualify as exempt from taxation as an organization or organizations described in Section 501(c)(3) of the Code, or the corresponding provision of any future federal tax code. In no event shall any of such assets or property be distributed to any Member, Governor or Officer of the Corporation, or any private individual.

The provisions set forth herein supersede TNC's original Articles of Incorporation, all amendments thereto and all restatements thereof, and constitute the official organizing document of the Corporation. Unless otherwise provided by applicable law, the internal affairs of the Corporation shall be regulated by the bylaws of the Corporation.

The address of the registered office of the Corporation in the District of Columbia is 1025 Vermont Avenue, N.W., Washington, DC 20005, and the name of its registered agent at such address is C T Corporation System.

CERTIFICATE OF FACT: THE NATURE CONSERVANCY

See scanned certificate

CERTIFICATE OF FACT: THE NATURE CONSERVANCY OF MONTANA

See scanned certificate

